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The Common-Sense

Poultry Doctor.

BY

JOHN H. ROBINSON,

Editor of Farm-Poultry, Author of "Poultry-Craft," "First
Lessons in Poultry Keeping," etc., etc.

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COMMON-SENSE POULTRY DOCTOR.

BY

H. ROBINSON,

Author of "Poultry-Craft,"
on Poultry Keeping, etc., etc.

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THE

COMMON-SENSE

POULTRY DOCTOR.

Introductory and Personal.

OF BOOKS and booklets on poultry diseases there are in the English language possibly a score—not including pamphlets or circulars distributed to advertise remedies. Besides, nearly every general work on poultry contains a chapter on poultry diseases.

Of works on poultry diseases a goodly proportion are by men who may be considered specialists, professionals. They are doctors of veterinary surgery, or regular medical practitioners whose interest in poultry naturally led them into the investigation of poultry diseases.

Why, then, another book on poultry diseases, and by an author without medical education and training?

The conditions of poultry doctoring are peculiar. The ordinary individual fowl is of such small value that a single examination or treatment by a medical practitioner would cost more than the fowl was worth. For this reason professional medical attendance on sick fowls is almost unknown. Occasionally, in case of an epidemic which completely baffles him, a poultryman calls in one

of the few qualified practitioners who respond to such calls when their regular duties permit. In some of the states the services of experts connected with the State Experiment Stations or Agricultural Colleges may be secured in such emergencies. As a rule, however, every poultryman has to be his own poultry doctor, and treat his fowls according to his judgment, aided sometimes by such light as he can get from books or from other poultrymen.

As a rule, the poultryman with no authority to consult, or in doubt after learning what he could from accessible sources of information, goes to the editor of a poultry paper for further advice, and, as a rule, the editor, if he can help the inquirer, is able to help him because of a little more experience with sick fowls, familiarity with the literature of the subject, and constant practice in deciphering from amateur descriptions the symptoms which enable him to identify the disease at least accurately enough to direct his correspondent where to look for information that will help him to a better knowledge of the case and its causes and the methods of treating it.

So it came about that engaging in editorial work on a poultry paper I had to renew the study of poultry diseases which, as a practical poultryman, I had discontinued years before, and considering them always from the non-professional point of view, from the standpoint of the practical poultryman, I appreciated, as a professional medical man probably would not, the difficulties encountered by the layman using some of the best works on poultry diseases. The work on diseases which I have myself found by far the most valuable for reference became satisfactory only after constant use had made me familiar with its contents. Even this work, though far more exhaustive than any other, is not complete. It contains nothing or scant information on a number of matters that are frequently the subject of inquiry, and it treats some diseases in such a way that not many using the book would discover the connection between a case of the disease and the treatment of it here. The smaller books are quite generally not explicit enough. In nearly all works on diseases of poultry a knowledge of the name, or at least the general character of a disease, is the first requisite in a search for information about it. This is precisely the knowledge that most of those consulting a book on poultry diseases go

to it for, and the books are therefore deficient in the very feature which would make them most helpful to poultrymen using them most—that is, to beginners.

In this book I have tried to develop a method of diagnosis especially suited to those not familiar with the various poultry diseases. It is not the professional method, and I do not suppose that it would be of much use to a professional, but I trust the novice in the treatment of sick fowls will find it practical and helpful. It is approximately the method evolved by the peculiar conditions under which I have to advise about sick fowls, and though it has its defects and its limitations, I think that most of those not able to recognize and name diseases by their visible symptoms will find it more satisfactory than anything yet offered them.

This method of diagnosis, the more complete list of diseases treated, the strictly popular style of the work, and the attention given many minor details which the professional writers have too often assumed everyone knew, are the special features which seem to me to furnish the reasons for another book on poultry diseases. Its object is to supply a connection which seems to be too often missing between those who need and those who have knowledge of the subject; and it is on such a basis that a non-professional may, with propriety, venture to treat the subject of poultry diseases.

For the matter of the book I have drawn freely on the standard writers on the subject, and, in general, have followed them in statements of symptoms, treatment, etc., but occasionally have supplied a fact from personal knowledge, and I presume that comparison would show here and there a variation from advices of such authorities as to the advisability of treating, though, on the whole, those authorities agree with the body of experienced poultry keepers in regard to the general unprofitableness of doctoring.

JOHN H. ROBINSON.

CHAPTER I.

To Doctor or Not to Doctor — When to Doctor and What to Doctor.

DISEASE in the poultry yard may be considered and treated on a very different basis from disease among human beings, or even among the larger domestic animals. In a general way the common diseases are the same, or similar in causes, symptoms, and treatment, though often differing in name; but in the case of a sick or injured animal, the owner may consider whether it will pay to restore the animal to health or sound condition, while, in the case of a human being, moral obligations and the natural affections impel those directly interested in the welfare of the patient to exhaust every means to preserve life, though prolonged life may mean misery to the sufferer, and care and expense to his family or friends. In the case of a sick or injured fowl the owner may consider the profit and loss aspects of the situation, but with this difference between the fowls and larger domestic animals: The value of the fowl is generally so small that the proportion of cases it does not pay to treat is very much increased, and it is only in exceptional instances that it pays to doctor sick fowls.

Some poultrymen take the extreme ground that it pays best never to doctor sick fowls at all, but to kill them at once, and so dispose of their carcasses that the health of the flock cannot be further menaced by the disease which affected them.

This position is too radical. I doubt whether anyone ever adhered to it strictly, except for a very short time. Those who claimed to do so, I have generally found killed only very sick fowls, though from their statements it would be inferred that they kept no

fowls not perfectly healthy. In practice they are less radical than in theory, and their practice agrees with that of most experienced and successful poultry keepers.

The general rule is :—

Give treatment when it can be applied to a flock conveniently and with reasonable expectation of beneficial results, and treat individuals, if necessary, when treatment is simple, easy, and needs to be administered but very few times.

This we may term the economic rule for treatment of sick fowls, the rule to apply when the first question to consider is the financial aspect of doctoring in any particular case.

If one wishes to treat sick fowls for the purpose of observing the course of a disease, its symptoms, effects of methods of treatment, etc., that is another matter, and one—it should be said—with which the poultryman who has to make his living from poultry, and finds his time pretty well occupied in making it, should have as little as possible to do. The practical investigation of diseases of poultry by poultrymen ends when it has gone as far as necessary to show how the disease in question can best be avoided; and in the treatment of diseases that are brought to or develop in his yards a poultry keeper can generally get experience in that line as fast as he needs it, even if he limits his efforts to the treatment of cases he regards as well worth trying to save.

In deciding that point, the novice is apt to err against his own immediate interests, just as he does in deciding what fowls it is worth while to keep to sell for breeding purposes. In his early experiences in poultry keeping he reserves for sale many fowls of a grade and value he soon learns it does not pay to hold, and in the same period he regards as worth an effort to save many fowls which a few years later he will unhesitatingly kill rather than be bothered treating and risk the danger of spreading disease in his flock. In the case of sick fowls, however, there is a compensating feature. Though he doctors many fowls it does not pay to treat, he is learning much that is of practical use to him. He gets a practical training in the general management of fowls, learns the premonitory symptoms of the common diseases, gains a better appreciation of the reasons for various preventive measures about which many

are too careless, and gets a better understanding of the limits of safety in the matters in which extraordinary risks are sometimes warranted.

On the whole, it may be said that the experience in treating sick fowls which the great majority of beginners acquire because they either are not convinced of the wisdom of the rule given above, or are much more lax in applying it than older poultrymen, teaches them many things better and quicker than they would learn them any other way; and looking at the matter in this light, we cannot say that their doctoring is unprofitable—provided they limit it to cases they judge promising. In virulent diseases and difficult cases that would require skillful treatment and careful nursing, it is always better to kill the fowls that are seriously affected, and devote one's whole attention to preventive treatment for the rest of the flock.

A great many diseases are quite readily cured by very simple remedies, or even by the mere removal of the cause, and by appropriate diet when taken in their early stages, but very stubborn if neglected until they are well advanced and the recuperative powers of the fowl correspondingly weakened. Too often poultry keepers neglect treatment until the condition of the fowl becomes serious, though they have known from the first that the fowls needed some attention.

If one is going to treat sick fowls at all, he should make it a rule to isolate sick birds as soon as noticed, and put them where he is sure general conditions are good and favorable. Very often fowls are kept where conditions are not satisfactory, but as long as no disease develops among them, may be tolerated. While a well fowl may stand such conditions, they aggravate disease, and often make the treatment adopted partly or wholly ineffective. The first step, then, should be to place the sick fowls where all sanitary conditions are good, and where the faults of the permanent quarters are offset by especially good conditions in the same line. Thus, if the permanent quarters are not well exposed to the sun, see that sick fowls taken from them are given a bright sunny place. If the permanent quarters are damp, be sure that the sick fowls removed from them are put in a dry place. If the fowls are kept in small bare yards, put the sick fowls where they have grass run if

possible. I might go on and give quite a long list of suggestions in this line. These serve to illustrate the point, and by observing this point the owner of a sick fowl will often make the best possible beginning of treatment, even before he identifies the disease and is able to give the full specific treatment laid down in the books.

As a matter of fact, good hygienic conditions and good nursing count for much more in the treatment of curable diseases than medicines. Without them medical treatment rarely effects a cure; with them many cures are made without medicine, or with medicines of no particular value in the case. It is quite common for poultrymen to mistake the character of a disease, give remedies according to their mistaken diagnosis, and because the fowl recovers, assume that the diagnosis was correct, and the treatment appropriate and effective, when the truth is that the fowl either would have recovered without treatment, or is restored to health by good nursing.

A great many diseases can only be identified by post mortem examination of fowls that die, or are killed for that purpose. A considerable proportion of these diseases will be positively identified only by expert examination, while cases that baffle the experts are by no means rare, for many cases are of irregular types, and a great deal remains to be done in the investigation of the diseases of poultry. These obscure cases the novice of course cannot give specific treatment, and unless one is quite sure he knows the general character of the disease, and the general line of treatment that should be followed, it is probably best to attempt no treatment whatever, merely putting the sick fowls in a comfortable place, supplying them with clean water and a light diet — if they will eat — and await developments. Otherwise the treatment given may aggravate the disease.

“Reading up” on diseases, in anticipation of possible cases or outbreaks in the flock is well as far as it goes. It makes one somewhat familiar with the nomenclature of the subject and with the most easily recognized symptoms. It is a good introduction to actual study and practice, but, with a case of sickness on hand, one never ought to rely on his recollection of what he has read in this way, but should compare the symptoms in the case with those

given for the disease he thinks he has recognized. A great many undertake to doctor sick fowls on a diagnosis which considered but one or a few conspicuous symptoms, and go wrong, when, if they had consulted their authorities, they would have known they were wrong, even if they failed to discover what they needed to know to set them right.

Isolated or rare instances of disease or death which cannot be explained need give no particular uneasiness. Many of these are due to accidental causes, or to conditions peculiar to the fowls affected and not general in the flock, and investigation in the flock would lead to nothing, while investigation of the individual case, when possible, would reveal nothing pertinent to the rest of the flock. In general, therefore, it is as well to give those cases no further thought. But if such a case is shortly followed by another similar case the poultryman should begin to watch his fowls very closely, and to look the premises over to see if anything is wrong. Then if cases continue to come, and he is still at sea about them, he should try to get advice.

CHAPTER II.

Indications of Health and General Symptoms of Disease.

DR. SALMON has aptly referred to a definition of disease as "a life, the manifestations of which deviate more or less from the normal." Then to detect disease we must observe a deviation from the normal. To observe such deviation we must know what is normal. The normal condition in one's own flock may not be the general, healthy normal. Very frequently it is not. There are many flocks that, because of unsanitary conditions or poor feeding, usually show such general symptoms which are common to nearly all diseases, as dullness, roughness of plumage, etc., not perhaps in as marked degree as in a sick fowl, but still enough to make the usual appearance of the fowls so different from that of fowls in perfect health and condition, that the first symptoms of disease are less conspicuous, and may pass for a long time unnoticed. This explains why so many poultry keepers describe as having appeared suddenly, symptoms which, to more experienced eyes, would have been plain long before, but which they did not observe until they became too pronounced to be overlooked by anyone. In a flock of fowls in vigorous health and good condition, any variation from the normal is immediately conspicuous. In a flock that is a little off in condition and appearance all through, diseases may make a good deal of progress before their presence is suspected.

A healthy fowl in good condition has a confident carriage. In the smaller and more energetic breeds this manifests itself generally in alertness, energetic movements, and bustling activity. In the larger fowls general movements are more deliberate and dignified,

but there is no lack of wide awakesness and business-like interest in life. In the medium sized breeds we get a mean between the activity of the light and the more serious attitude of the heavy breeds, but in them all the indications of soundness and good condition are easily recognized.

The eye should be bright and clear. The skin of the face and comb and wattles should be smooth, pliable, and a clear red in color, bright red in males after the age of puberty is passed, and the same bright red in the females when laying. In chickens and in hens not laying, the comb is not so highly colored, but still should show a healthy red. In some game fowls, and in a few rare breeds, the comb is normally very dark, but in all the commoner and popular breeds, the comb is a bright red, and—allowing for some lack of color in the combs of immature stock and hens that are not laying—any variation from a good red, (as a yellowish or purplish tinge), should be regarded with suspicion, and, having been noted, should be investigated.

The feathers, except during molting, should be smooth, quite glossy when new, but becoming duller with age until when quite dead, just before the molt, they soil quickly and are not easily cleaned. The ordinary wear on the plumage begins to show slightly almost immediately after the molt, and there is a progressive deterioration of the feathers, slow at first, very rapid just before the molt, but healthy feathers have a life and quality that is absent from the plumage of fowls in poor condition, and poor plumage means something going wrong.

The skin and scales of the shanks and feet should be smooth and clean looking. Any roughness, or a dry shriveled skin, means trouble, either local or as a feature of the general state of health. In yellow skinned fowls bad condition of feet is more noticeable than in others, but whatever the color of the feet, between those in good condition and those that fail even a little of good condition, the difference is very plain after having been once observed. When fowls are kept in dry places, especially on coal ashes or on alkali soils, the legs are apt to bleach badly when the skin under the feathers is a little affected. Under other conditions the condition of the skin of the feet generally indicates the condition of the skin of the body, and is a symptom not to be neglected.

The habits of fowls also afford indications of their physical condition. The normal fowl is apt to be governed somewhat by its primitive instincts and natural tendencies, even when not impelled by necessity. Fowls that eat only what they get with little effort, and then remain inactive until near the next feeding time are not right or are not managed right. In such flocks digestive disorders are likely to be general. Not all—and possibly at a certain time none—of the fowls may have digestive trouble, but they have habits that develop such troubles, and therefore should be corrected.

Sometimes inactivity or reluctance to forage are due to sore feet, or a beak so injured or deformed that the fowl picks up small grains with difficulty. Hence a bird that mopes or sits around should be caught and examined to find out whether any trouble of this kind exists.

General lack of condition in a flock is frequently not suspected by a poultryman who sees closely little stock but his own, or who looks at it with too partial eyes. Again and again I have seen people in all seriousness call attention to the fine condition of their fowls when lack of good condition was evident all through it. As a rule, a poultry keeper whose fowls are subject to any bad condition, overcrowded, lack exercise, house ill ventilated, yards foul, houses damp, etc., needs to suspect that these have some effect on his fowls, and if his fowls seem all right to him, would do well to compare them with others that are kept under better conditions, and perhaps also compare notes with others. In all matters of this kind discussion sharpens the wits, and should make the judgment more accurate.

And it is of the utmost importance that judgment in such matters should be correct, for while in this book on diseases we must pass the subject, as incidental, with a brief mention, to know the signs of health, and those first variations from them which indicate the presence of conditions favorable to development of disease, is of far greater practical value to the working poultryman than to know all about all diseases. Within limits, and as long as health continues sound, we may, in practical poultry keeping, disregard or depart from some of the rules of safety. Our warrant for doing this is the fact that the rules may be violated much or many times without the appearance of the possible bad consequences. We take

risks which are justifiable or otherwise, according to our ability to control the situation, and this, in many cases, (if not in all), depends upon being able to detect the early indications of unfavorable developments, and take steps to counteract them before they reach a serious stage.

Delicacy either in diet or susceptibility to weather changes is a condition which calls for the serious consideration of the poultry keeper who finds it in his flock. There are many flocks extremely susceptible to variations in the weather, in the conditions under which they are kept, and even unfavorably affected by slight changes of diet. The number of flocks of fowls, especially those kept in close quarters, that become dependent on the perfect working of the keeper's system is surprisingly large. Though there may be no disease in such flocks, vitality is low and constitution impaired, and the stock is often reduced by outbreaks of disease which would have had little effect on more robust fowls. Delicacy in a flock calls for a more robust method of treatment.

CHAPTER III.

General Rules for the Prevention of Disease.

THE first and most important requisite for the prevention of disease is good physical condition based on a good constitution and preserved by good housing, yarding, feeding, and care.

The making of a good constitution may be said to begin with the selection of vigorous healthy breeding stock. This means not simply stock that appears to be in good condition at the breeding season, but stock that has never at any time been seriously out of condition. Over and over again in the experience of thousands of poultry keepers it has been shown that the offspring of fowls apparently cured of a disease are peculiarly subject to that disease, or to some kindred disease, and that such stock seems to succumb very easily to disease. It does not always happen so, but it happens so often, and the losses thus incurred are so serious, that old poultrymen are generally agreed that a fowl that has had a serious sickness is worse than useless as a breeder. Such a fowl, if possessed of special merit, might be used in a special mating, the object being to perpetuate his special points of excellence. And the offspring of such a mating, if given special care to prevent the disease the parent had, might escape it. Then by careful breeding and judicious handling tendency to the disease might be eliminated from the stock, and so the original excellence preserved free from the original weakness, and finally introduced into the entire flock. But it is only one bird in a thousand that is good enough to be worth this trouble, and no matter how good the bird, it is a mistake for a breeder to rely upon a fowl that has had a sickness likely to

affect his progeny. If he breeds from such birds, it should be as stated above, in special matings, his regular matings being of fowls that had always been healthy.

Above all, a breeder should avoid breeding from a flock all, or most of which had been sick, for from such breeding stock there is almost always a large proportion of weakly, stunted chicks that succumb easily to disease.

The next thing to observe for the preservation of health is the natural environment—the soil and atmospheric conditions.

On heavy or clayey soils, all filth diseases are much more troublesome than elsewhere. On loose sandy, well drained soils, the dangers of filth diseases are so greatly reduced that the poultry keeper, if so disposed, may safely reduce his efforts to maintain strict cleanliness, often to the point of neglect of cleanliness, without serious risk. On soils of intermediate character, maintenance of safe sanitary conditions varies in its requirements with the nature of the soil.

Atmospheric conditions are, as a rule, of less importance. Fowls become accustomed to a certain general atmospheric condition, or range of conditions, and endure without inconvenience conditions which, to unacclimated fowls, might be serious. The most important point to observe in regard to atmospheric conditions is with unacclimated fowls. Fowls that are new to a locality, especially if brought from a very different climate, are often injured by exposure to weather conditions which do not hurt acclimated fowls in the least. To avoid diseases that might develop in this way, keep such fowls from exposure to the full severity of weather extremes, whether heat, wet, wind, or cold.

The house problem, as it concerns health, may be made simple or difficult according to the system of housing adopted.

In an open house with fresh air always abundant, what are known as the temperature diseases are reduced to the minimum, though in such houses fowls lacking in vigor are perhaps more likely to contract such diseases as pneumonia, than in warmer houses.

In warm houses the health of the fowl depends very much upon the attention given to the ventilation, and not to constant ventilation through ventilators supposed to have certain desired effects, but to ventilation by adjustment of doors and windows to suit the

daily as well as the irregular or seasonable changes of conditions. Occasional neglects of doors and windows of tight houses are fruitful causes of disease, while the general habit of keeping such houses shut tight much more than is necessary, makes the average vitality of fowls kept in them much lower than it should be.

The effect of cleanliness in the house on the health of the fowls is also influenced by the type of house used. If a house is to be closed tight and kept warm so that all gases and odors are retained in it for hours and the air laden with them, droppings should be removed daily. If the house is open so that odors and gases are carried off such frequent cleanings are not necessary.

The observations already made on soils apply in a general way to yards. In connection with the yards we have further to consider such disinfection and renovation of the soil as may be necessary, and the effects of neglect of these upon the general condition of the fowls occupying the premises. Yards used too long without renovation are often the unsuspected cause of disease, or, where no disease develops, of failure of the stock to thrive. Sanitary conditions must be preserved in the yard as well as in the house.

The diet of fowls and the method of feeding them are directly responsible for most of the digestive disorders. We cannot take that subject up in this connection, but the reader should understand that only by judicious and proper feeding can he avoid the common troubles of poultry that are most obscure in their symptoms and most difficult to deal with.

Methods of exercising fowls are generally intimately related to methods of feeding them. A system of feeding that discourages exercise is wrong except for chickens to be marketed early, or in fattening. Frequently a ration that is good and safe, if given to fowls that exercise freely, is a regular disease breeder for fowls that take little exercise. A most conspicuous illustration of this is found in the case of corn, which, fed under proper conditions, is a most satisfactory food, but when fed in disregard of appropriate conditions quickly puts fowls out of condition.

Overcrowding, when very bad, is likely to breed disease; when not so bad its results are more likely to be limited to lack of thrift or productiveness.

Contagious diseases are most frequently introduced into a flock

with additions from outside. It is a good plan not to allow new stock to mingle with the old for at least ten days to two weeks after it is brought on the place. This rule should be followed even with stock from flocks known to be free from disease, for it often happens that disease germs, latent and harmless in one flock, become active and dangerous when stock from that flock is moved to another place. Two weeks should give ample time for development of latent disease, and if no bad symptoms appear within that time, the new stock may be put with the old.

The introduction of new males during the breeding season is a risk many poultrymen take without thought, and subsequently have abundant occasion to regret. At that season the delay caused by quarantining a new bird needed for service seems intolerable, and the breeder frequently puts him into the breeding pen without much examination. From such an event many a poultryman dates a long period of trouble with parasitic or skin disease introduced with the new male, and by him rapidly communicated to all females with which he comes in contact.

As far as possible the poultry keeper should depend for the prevention of disease on conditions which make for health rather than upon special correctives of unhealthy conditions. Those who must keep fowls in close quarters must rely much upon disinfectants and strict attention to hygienic conditions. Those who give fowls liberal yard room need give less attention to sanitation. The difference between the two systems quite closely parallels certain differences between farm and city life, between sparsely settled and densely populated areas. Give nature room and she attends to sanitation and various other matters relating to health, in her own way. Crowd beings of any kind together, and special, and sometimes artificial and complex sanitary systems and requirements become necessary.

CHAPTER IV.

The Symptoms of Disease.

SOME diseases are distinguished easily by peculiar and unmistakable symptoms. Some general symptoms are common to a great many diseases. Some frequent symptoms are common to diseases of certain classes, and make it sometimes very difficult to distinguish between them. Of some diseases the symptoms are obscure, not especially manifested in outward appearance or in any function, and distinguishable only by post mortem examination — often only by expert examination. Occasionally a disease develops which baffles the most careful examination to determine its precise character.

Diseases are not always simple and free from complications. Hence the combinations of symptoms found are sometimes very puzzling, especially to a layman with no intimate knowledge of the subject.

Diseases, as they develop in the poultry yard, are rarely "typical" cases, presenting all symptoms of one disease plainly, and no others. It is perhaps more common to find one or more symptoms absent, or to find some symptoms varying greatly from the usual type, and even more closely resembling symptoms in some quite different disease. Hence, apart from the diseases having unmistakable symptoms the diagnosis of diseases, even by men of medical training, is often inaccurate, while that of the common poultryman is apt to be wrong as often as right. However, if diagnosis is correct in half, or even less, of the cases discovered, and the disease given proper treatment at an early stage, and proper steps taken to prevent its spread through the flock, and measures adopted to prevent its recurrence, much has been gained.

The more common and most generally troublesome of the diseases showing no plain symptoms outwardly it is possible even for a novice to identify by post mortem with sufficient accuracy to enable him to give preventive and dietary treatment adapted to the situation.

In this chapter I have undertaken—

1.—To arrange and group the visible symptoms of the diseases of poultry in such a way that a poultryman may more systematically and carefully observe the symptoms of sick fowls; also be able to distinguish between general and special symptoms.

2.—To briefly indicate the post mortem symptoms, especially of diseases not characterized by outward symptoms.

In preparing the list of symptoms from which the schedule which follows has been compiled, I have used principally Salmon's "Diseases of Poultry," supplementing it here and there from statements in Sanborn's "Farm-Poultry Doctor," Vale's "Manual of Poultry Diseases," Hill's "Diseases of Poultry," various articles on diseases in the poultry journals, especially those by Woods, and, occasionally, from personal observation indicating symptoms or facts which our medical authorities have overlooked.

Visible Symptoms of Disease.

Symptoms in the Attitude and General Condition of Fowls.

The impulse or instinct of a fowl affected with a disease which makes it feel sick is to remain quiet and out of the way of the rest of the flock. This disposition manifests itself differently in different fowls and different circumstances, and is also probably somewhat influenced by the degree of indisposition. Hence all fowls sick with the same disease do not act alike, and while *weakness*, *dullness*, *drowsiness*, *inactivity*, *sluggishness*, etc., are given as symptoms in many diseases, they are, as a rule, symptoms of no particular value in determining the character of the disease. We note, further, that as between these many terms signifying much the same things, it is practically impossible to make fine distinctions. The same observer might, at different times, describe the same condition by different terms, or apply the same term to different degrees of debility. So, though we find in the descriptions of symptoms furnished by authorities on poultry diseases, a

great variety of terms indicating weakness as variously manifested in the general attitude of the fowl, and these will be noted in the full descriptions of symptoms; they are to be regarded as of only minor importance in the diagnosis of disease.

The terms used to indicate visible lack of condition, and the diseases with which each is identified by our authorities, are :—

DULLNESS—symptom in bronchitis, catarrh, indigestion, gastritis, enteritis, constipation, worms, atrophy of the liver.

DROWSINESS—symptom in aspergillosis, atrophy of the liver, congestion of the lungs, leukæmia.

DEPRESSION—symptom in enteritis.

DUMPISHNESS—symptom in canker.

SLUGGISHNESS—symptom in inflammation of the liver, eczema.

STUPOR—symptom in atrophy of the liver, vertigo.

TORPOR—symptom in enteritis.

INACTIVITY—symptom in catarrh, black rot, diarrhea, enlargement of the testicles.

WEAKNESS—symptom in cholera, dropsy of the heart.

EXTREME WEAKNESS—symptom in aspergillosis.

GENERAL DEBILITY—symptom in inflammation of the oviduct.

GENERAL LASSITUDE—symptom in enteritis.

RAPID LOSS OF STRENGTH—symptom in peritonitis.

LISTLESSNESS—symptom in dropsy.

ISOLATION—symptom in worms, cholera.

DIFFICULT LOCOMOTION—symptom in constipation.

STIFF WALK—symptom in worms.

ROUGH PLUMAGE—symptom in cholera, worms, leukæmia, gastritis, gapes, diarrhea, constipation, aspergillosis.

As everyone who has observed many sick fowls knows, this list by no means exhausts the possibilities. There is practically no limit to the variations of arrangement of such symptoms and names of diseases that will make statements easily applied to many cases. We therefore class all such symptoms as general symptoms not peculiar to particular diseases. Such symptoms are generally the first noted by the quick observer. They indicate a diseased condition; but having learned this much through them, we may dismiss them from further consideration as more likely to confuse than to aid attempts at diagnosis.

EMACIATION — is a symptom of more importance in determining the character of a disease, because it usually indicates the presence of one of several most difficult diseases to deal with, and is in each the most conspicuous symptom. These diseases are tuberculosis, asthenia, ("going light"), and anæmia, (called by Salmon, leukæmia). Emaciation is also noted as a symptom in aspergillosis, inflammation of the kidneys, gastritis, enteritis, worms. Such are the diseases in which it is most frequently observed, but it may be a symptom in any disease which a fowl resists for a long time, and, of course, is also seen as a condition in many cases where a thin, emaciated fowl contracts disease.

Symptoms in the Actions of Fowls.

Under this head I group a class of symptoms which rarely escape the notice of even the least experienced of poultry keepers. The most conspicuous of them is convulsions, or convulsive movements, principally of the head and neck, though frequently affecting in a lesser degree the body as well, and occasionally of such nature that the bird entirely loses control of the limbs, and either lies helpless or with limbs moving spasmodically.

CONVULSIVE MOVEMENTS OF THE HEAD AND NECK — occur in cramps, gapes, and frequently in large combed birds in common colds. Movements which might appear to be convulsions are sometimes a symptom in various diseases, such, for instance, as a swallowing motion when neither food nor drink is being taken. Such movements, while to some degree similar, are not convulsive, for they are under control of the bird, and made with a purpose.

A SWALLOWING MOTION WITHOUT CONVULSIONS — indicates accumulation of mucus in throat and windpipe, or obstruction of those parts.

CONVULSIONS — are common, but not invariably a symptom in epilepsy, atrophy of the liver, vertigo, worms, enteritis, and in the last stages of peritonitis, and cholera.

A SWALLOWING MOTION ACCOMPANIED BY A WRITHING — especially of the upper part of the body, is a symptom in crop bound.

GIDDINESS AND STAGGERING—mentioned as symptoms in vertigo and enteritis, are features of convulsions; while chills, also given as a symptom in enteritis, would not readily be differentiated from convulsions. The head twisted and eye turned up, while the fowl moves in a circle, is a symptom of vertigo.

CONTRACTION OF THE MUSCLES—sometimes observable in the toes, sometimes in the neck, is a symptom of rheumatism. When this symptom appears, affecting the neck, it is usually twisted and drawn back between the shoulders.

LAMENESS AND LOSS OF USE OF THE LEGS—are symptoms quickly noted; both occur in succession or alternation in leg weakness and rheumatism. Lameness may also occur with, and as a result of the various symptoms of diseases of the feet, and is frequently the result of injury to the feet, legs, or back.

RESTLESSNESS—indicating fever, is a symptom in peritonitis.

GAPING—symptom in gapes, enteritis.

Symptoms in the Appearance or Condition of Special Parts of the Fowl.

Under this head we consider local symptoms, not conspicuously connected with any important function, leaving functional symptoms to be taken up separately a little further on.

Head Symptoms.

In a way the appearance of the head of the fowl is a factor in such general symptoms as dullness, drowsiness, emaciation. A good observer may note something wrong in the expression of the eye, or appearance of the head, before the general appearance of the bird is unusual enough to attract attention. Such symptoms as those we need not consider further than in the general way. The conspicuous symptoms of the head parts, and the diseases or conditions they indicate are:—

Of the Comb.

COMB, PALE—symptom in leukæmia, (anæmia), dropsy, tuberculosis, enteritis. In these diseases the paleness of the comb is generally very noticeable. In many others there is much less color in the comb than when the bird is in good health.

COMB, DARK, PURPLISH—symptom in congestion of the lungs, enteritis; sometimes in bronchitis.

A distinction must be made between the dark purplish comb seen in these diseases and the comb the tips of which turn bluish when chilled.

COMB, PURPLE, OR TIPS TURNING BLUE, THEN BLACK—symptom in black rot.

SCAB ON COMB—a dark or yellowish patch or scab which cannot readily be removed, is a symptom of ulceration of comb. This symptom must be distinguished from a simple scab, the result of an injury.

WATTLES ENLARGED AND HARD—symptom in dropsy of the wattles.

WATTLES HAVING WHITE POINTS OR PATCHES which enlarge and run together—symptom in eczema.

YELLOW WARTS ON FACE AND COMB—symptom in chicken-pox.

CHEESY LUMPS ABOUT THE EYES—symptom in roup.

EYELIDS GUMMED AND SWOLLEN—symptom in catarrh.

JAUNDICE—symptom in inflammation of the liver.

PUFFING AND SWELLING OF THE FACE—symptom in roup.

INFLAMMATION OF MOUTH—symptom in gastritis and roup.

INFLAMED MUCOUS MEMBRANES—symptom in bronchitis.

GRAYISH WHITE MEMBRANOUS PATCHES IN THROAT—symptom in diphtheria.

PIP, scale on tongue—symptom in catarrh, roup, bronchitis, pneumonia.

Feather Symptoms.

LOSS OF FEATHERS from parts of the body—symptom in favus.

FEATHERS BREAKING at the surface of the skin indicates scabies.

IMPROPERLY DEVELOPED FEATHERS—deformed feathers, indicate inflammation of the kidneys. Feathers are also lost, broken, or damaged by other fowls eating them, generally from the rump and neck; and from the backs of hens in the breeding season by the wear of the feet of the males.

Skin Symptoms (of the Body).

SKIN PUFFED WITH AIR—symptom of emphysema.

SCURFY THICKENED SKIN—symptom in favus.

The skin of any part of the body bare of feathers, and exposed to sun and wind, turns quite a dark or bright red; if the skin, notwithstanding its high color, seems clean and healthy, it is probably not in any way diseased, and will return to its normal color after the feathers grow on it.

TUMORS AND SORES—generally result from injuries, though I have seen and also had reports of boil like sores on fowls which seemed to be identical with boils on the human person, and probably due to similar conditions or causes.

Leg and Foot Symptoms.

THICKENED SKIN of under side of feet — corns.

SWELLING ON FOOT—bumble foot.

ABSCESSSES on soles of feet and between toes — symptom in bumble foot.

SWOLLEN FEET AND TOES—dropsy of the feet.

SWOLLEN JOINTS—rheumatism.

SKIN OF LEGS DRY AND ROUGH—symptom in fish skin disease.

SCALES OF SHANKS AND TOES LOOSE raised, with dead whitish crust forming under them — symptom of scaly leg.

Visible Symptoms in Functional Operations — Breathing.

Normally the function of breathing attracts no attention whatever. Anything out of the usual in this connection is therefore an indication of something wrong.

RAPID BREATHING—is a symptom in gastritis.

DIFFICULT BREATHING—is noted in catarrh, dropsy of the heart, congestion of the lungs.

LABORED BREATHING—symptom in aspergillosis.

To make nice distinctions between difficult and labored breathing is often impossible.

A WHISTLING SOUND—in breathing indicates bronchitis or defective air passages.

SNEEZING—is a symptom in catarrh.

A peculiar croaking sneeze is often made by fowls when eating too rapidly.

Head Discharges.

WATERY DISCHARGE FROM NOSTRILS—symptom in catarrhal cold, catarrh.

FERMENTING SOUR, WATERY DISCHARGE FROM THE NOSE AND MOUTH—symptom sometimes in crop bound.

MUCUS DISCHARGE FROM NOSTRILS AND MOUTH—occasional symptom in gapes.

FETID DISCHARGE FROM NOSTRILS (having the “roup smell,” a peculiar nauseating odor which, once observed, is ever afterward easily distinguished)—symptom in roup, contagious catarrh, sometimes in diphtheria.

FROTHY DISCHARGE FROM THE MOUTH—symptom in enteritis.

BLOODY MUCUS FROM MOUTH—symptom in congestion of the lungs.

BELCHING GAS—symptom of catarrh of the crop.

WATER ESCAPING FROM THE CROP THROUGH THE MOUTH—when fowl is held head down is not a symptom of disease unless the discharged fluid is sour or foul, when it indicates a bad condition of the crop.

Appetite.

IRREGULAR APPETITE—indicates overfeeding, indigestion, or, (not infrequently), food poorly prepared or of poor quality.

LACK OF APPETITE—is given as a symptom in worms, constipation, catarrh, bronchitis, and enteritis.

LOSS OF APPETITE—is given as a symptom in aspergillosis, black rot, diarrhea, enteritis, gastritis, inflammation of the kidneys, leukæmia, peritonitis, inflammation of the liver.

Whether lack of appetite means poor appetite, and loss of appetite no appetite, is not clear. Probably the distinction is not always carefully observed. Appetite symptoms would not be expected to be uniform in the same disease, for fowls, like people, vary much in regard to the appetite in sickness. Considered by themselves, appetite symptoms are of little, if any, use in determining the character of most of the diseases mentioned in connection with them.

ABNORMAL APPETITE—fowls frequently display abnormal appetites, eat voraciously of food from which they apparently

extract little nourishment, or take excessive quantities of such food accessories as grit. Such phenomena indicate diseased condition in the digestive tract, but our authorities have little to say about them. They are probably properly described as extreme symptoms of indigestion.

INTENSE THIRST—is mentioned as a symptom in gastritis, aspergillosis, enteritis, cholera, but will be observed in many other diseases. In any case of disease accompanied by a fever, or feverish conditions, marked thirst is likely to be found.

The Crop.

THE CROP DISTENDED AND HARD—is “crop bound.” The crop bound condition may be due to obstruction of the crop, or to disease of the crop or digestive tract, preventing the regular passage of food through the system.

CROP BOUND is a symptom in catarrh of the crop, sometimes in diarrhea, and in cholera.

WHEN THE CROP IS PROMINENT AND HANGS LOOSELY—the fowl is said to have “slack crop.”

Vent Discharges.

DIARRHEA is a symptom in a great many diseases. It may have no special significance, or it may, by certain peculiarities, be of great assistance in identifying a disease. The following forms of diarrhea have been described:—

SIMPLE DIARRHEA—itself a form of disease—symptom, excrement soft, yellowish, whitish, or greenish.

Many people call every case of disease in which there is diarrhea with greenish excrement “cholera,” and many reported cures of cholera are merely cures of simple diarrhea. *Simple diarrhea* has been observed as a symptom in cases of worms, tuberculosis, and in black head in turkeys.

BLOODY DIARRHEA—symptom in enteritis, appendicitis.

DIARRHEA WITH DARK EXCREMENT TURNING TO YELLOW—symptom in black rot.

GREENISH DIARRHEA WITH SOLID EXCREMENT—symptom in early stages of bacterial enteritis.

GREENISH DIARRHEA WITH EXCREMENT DARK AND LIQUID—symptom in later stages of bacterial enteritis.

DIARRHEA WITH YELLOW URATES (the white part of the excrement of birds) — symptom in cholera. Salmon says that while yellow urates do not invariably indicate cholera, because the urates are frequently tinted from other disorders, they afford a valuable indication. It is to be inferred from his statement that while yellow urates occur in other diseases, they invariably occur in cholera in the early stages; hence, if urates are not yellow it may be concluded that the disease is not cholera unless we have:

DIARRHEA WITH GREENISH OR DEEP GREEN URATES—a symptom of the later stages of cholera; or

DIARRHEA IN WHICH WHITE URATES ARE PASSED IN VERY LARGE QUANTITIES, the excrement consisting almost entirely of urates mixed with colorless mucus. Such a diarrhea has been observed as a very early symptom in several cases of cholera. This diarrhea gradually changing, the urates becoming deep yellow, and finally green.

CONSTIPATION—occurs in fowls far less often than diarrhea, and often passes unnoticed when it does occur, unless very bad. Painful and ineffective efforts to evacuate the bowel are the symptom of constipation. Frequently the affected fowl cries with pain.

CONSTIPATION—is a symptom in indigestion, (dyspepsia), gastritis, peritonitis.

Other Bowel Discharges.

A THIN WATERY DISCHARGE—soon becoming white and offensive, frequent passage of small quantities of excrement, the membrane of the bowel much inflamed, with the inflammation often extending to skin around the vent, are symptoms in vent gleet. This should not be confounded with a simple whitish diarrhea.

Symptoms Associated with Laying.

UNSUCCESSFUL EFFORTS TO PASS EGG, the egg being sometimes partially extruded; sometimes not at all—symptom of egg bound.

EGG LODGED LOOSELY IN ABDOMINAL CAVITY—symptom of rupture of the oviduct.

ABNORMAL LAYING, continued production of abnormal eggs,
— symptom of inflammation of oviduct.

PROTRUSION AT THE VENT—in laying hens a symptom of prolapsus of the oviduct; occurs occasionally in fowls under other circumstances, is then protrusion of the bowel.

SUDDEN DEATHS—symptom of rupture of the heart, apoplexy, choking.

Symptoms Discovered by a Post Mortem Examination.

Importance of Noting Inward Symptoms.

Some diseases readily identified by outward symptoms have only those outward symptoms; others have also peculiar internal symptoms. A few diseases can be identified only by post mortem examination. When a disease is presumed to have been correctly diagnosed by the outward symptoms a post mortem would be made only to clear up any lingering doubts one might have as to the correctness of his conclusions. When the outward symptoms noted seem insufficient for diagnosis the poultryman who wants to know what was wrong generally "opens" the body of the fowl and examines the internal organs. Some of the most common diseases are readily identified in this way by anyone, but there are many cases beyond the skill of the layman to identify, and, as has already been said, some that the experts have to give up. Generally, however, in case of a common disease anyone can learn enough of the condition of the fowl, and of the parts affected, to know to what class of causes the trouble is probably due, to what class of disease it belongs, and what general course is best to pursue with fowls affected by or exposed to it; and this, after all, is the principal thing. If one is not familiar with the appearance of the organs of a healthy fowl he should, when making a post mortem examination of a fowl that had died of a disease the character of which he wishes to discover, kill and examine a fowl apparently in perfect condition, that, comparing them part by part, he may more certainly arrive at the facts. More, a poultry keeper who does not know what the internal organs of a healthy fowl look like, should lose no time acquiring that knowledge, but take advantage of

the first opportunity to examine them, and as fowls or chicks from his yards are killed, ought to observe the condition of the internal organs of the fowl, just as day by day he notes outward symptoms, for in this way one will often discover the presence in his flock of a disease without marked outward symptoms in time to adopt effectual preventive measures when, if the disease continued unsuspected until several deaths from it had occurred, many more members of the flock might be past saving.

How to Make a Post Mortem Examination of a Fowl.

In the case of a healthy fowl to be used for the table after having served as a subject for examination, the way the fowl is intended to be cooked might be allowed to determine the method of making examination. If a fowl is to be cut up before cooking, it is a simple matter to remove wings and legs, and then by separating the breast and back leave the organs exposed, but undisturbed, and the examiner can remove and inspect them as he wishes. If the carcass is to be drawn in the usual way, it is not so easy to make a satisfactory observation of the internal organs, as they cannot be observed in position, but still one can learn a good deal of their appearance and condition if they are removed carefully.

If the examination of the healthy carcass is desired to contribute as much as possible to the acquisition of skill in the examination and treatment of diseased fowls, it is well to make it in the same way that the post mortem would be made on a dead fowl. It is obvious that the "butcher" methods of examination mentioned above are very crude methods from a surgical point of view. One of the best directions I have seen for making a post mortem examination of a fowl was given in an English poultry paper recently.

It is:—

"Take the dead bird and lay it on a wooden table, or on a piece of strong board, breast uppermost. Spread out the wings and the legs, putting a small nail through the joint of each wing and through the center of each foot. It is not necessary for the bird to be entirely plucked; it will be enough to pluck the breast, and when this has been done pinch up the skin at the point of the breast bone, and cut it straight through from the vent to the crop. Having done this, draw the skin back on both sides, so as to leave

the flesh fully exposed, and then with a sharp knife cut through the flesh on both sides of the breast bone, and with a strong, blunt pointed pair of scissors, cut out the center of the breast bone entirely, taking particular care in doing so not to injure the heart, as a flow of blood from the heart will interfere with subsequent operations. When this has been done the principal organs will be seen fully exposed."

Liver Symptoms.

Liver troubles are by far the most frequent of diseases requiring a post mortem for identification. Perhaps the most common condition of the diseased liver is :

LIVER ENLARGED, gorged with blood, tender, easily torn or crushed — indicates inflammation or congestion of the liver.

LIVER SHRUNKEN, with granulated surface — atrophy or wasting of the liver.

LIVER SHRUNKEN, hardened, marbled, or spotted with yellow or gray patches — fatty degeneration of liver.

LIVER SOMEWHAT ENLARGED, dark colored, surface sprinkled with minute grayish spots — symptom in leukæmia.

LIVER GREATLY ENLARGED, softened, very dark, or dark green, gall abundant — symptom in cholera.

LIVER (IN TURKEYS) SPOTTED, with whitish or yellowish or brownish patches — symptom in blackhead.

Sometimes the same condition or symptom is discovered in the liver and other organs, or certain conditions of other organs occur with certain liver symptoms.

ABSCESSES in liver, lungs, kidneys, and spleen are symptoms in aspergillosis.

LIVER ENLARGED and distended with blood, spleen enlarged and pale, intestines, particularly the cæca, red and containing much mucus — symptom in enteritis.

WHITISH OR YELLOWISH nodules or tubercles in liver, spleen, and peritoneum — symptom in tuberculosis.

BILE, BLACK, THICK AND HARD—symptom sometimes found in biliary repletion (jaundice).

BILE COLORING ORGANS adjoining gall bladder — symptom in biliary repletion (jaundice).

Special symptoms in the kidneys are neither so frequent nor so conspicuous.

KIDNEYS MUCH ENLARGED, grayish colored and hard—symptom in inflammation of the kidneys.

KIDNEYS GORGED WITH BLOOD—symptom in cholera.

In the lungs symptoms of several bad diseases are found. To test the condition of the lungs put a piece of one in water; a healthy lung will float, a diseased one will sink.

LUNGS DARK, full of blood, and hard—symptom in pneumonia.

LUNGS CONTAINING CHEESY NODULES—symptom in tuberculosis.

YELLOWISH OR WHITISH NODULES in internal organs, especially the organs of respiration—symptom in aspergillosis.

In cases of sudden death the symptoms that explain the trouble are likely to be found in the heart.

HEART UNEVEN LOBED, large on one side and small on the other—symptom of failure or rupture of the heart, (syncope), hypertrophy.

HEART SAC DISTENDED with liquid with false membrane adhering to heart and heart sac—dropsy of the heart sac.

INTERNAL SURFACE OF HEART REDDENED and deposits of clotted lymph adhering to it—inflammation of the internal membrane of the heart.

INTERNAL HEMORRHAGES—rupture of heart or blood vessels.

INTESTINAL WALLS THICKENED AND ULCERATED—symptom in tuberculosis.

NODULES WHITISH, YELLOWISH, OR BROWNISH IN INTESTINAL WALLS—symptom in nodular tæniasis.

LINING OF ABDOMINAL CAVITY INFLAMED deep red in color—peritonitis.

YELLOWISH OR REDDISH YELLOW LIQUID IN ABDOMINAL CAVITY—peritonitis.

WORMS IN INTESTINES—Worms are most frequently found in the intestines, though they infest other internal parts. Sometimes conditions produced by worms resemble symptoms of tuberculosis.

WORMS IN WINDPIPE, or trachea—gapes.

MITE LIKE POWDER, whitish or yellowish in color, on surface of air sacs — air sac mite.

The condition of the ovaries of the female, and testicles of the male often reveal the reason for the failure of the hen to lay, or for the laying of abnormal eggs, and for sterileness in males.

OVARIES SMALL WITH OVA (EGGS) VERY SMALL — is a natural condition in a hen not laying or about to lay. Discovered in a hen which failed to lay naturally, it indicates atrophy of the ovaries.

TUMORS OF THE OVARY are quite common.

OVA BROWNISH OR BLACK, easily crusted and containing a putrid liquid — gangrene of the ovary.

Corresponding with these diseases of the female organs of reproduction, we have in the male organs :

ATROPHIED AND ENLARGED TESTICLES, and sometimes tumorous or cancerous growths. Any deviation from normal condition of these organs will furnish an explanation for sterility, or low fertility.

CHAPTER V.

A Few General Remarks on the Diseases of Poultry and Their Treatment.

IT HELPS to a better understanding of the diseases of poultry, and their prevention and cure, to know that most of the diseases of poultry have their counterparts in cause, character, and effects in human diseases. This fact is not generally appreciated as it should be. Many people are wont to regard themselves and their fowls as so far apart in the scale of development that there can be little in common between them. A physician once wrote me asking what to do for a constipated fowl. I replied: "Give the same dose you would a two year old child." By return mail I received a letter to this effect: "Thank you for the suggestion. It never occurred to me that the diseases of fowls and human beings were essentially alike, and should be treated the same, but when you stop to think of it, there is no reason why they should not be. I don't think I'll need to trouble you again about treating diseases."

The similarity of diseases in fowls and men is less clear than it might be because of the differences in names of diseases, because it has been customary to group many poultry diseases under a general name, and because it is only recently that poultry diseases have been carefully investigated, and the different forms of disease affecting the same parts differentiated. Structural and other peculiarities of fowls account for slightly different manifestations of symptoms, and also for a few diseases that are peculiar to fowls; but, on the whole, any disease discovered in the poultry yard has its counterpart among human diseases, is produced by like causes, and requires much the same treatment to effect a cure.

Chapter II. treated briefly the general causes of disease, with special reference to the prevention of disease. In various chapters following this the development of numerous diseases from a common cause will be traced in connection with the categorical presentation of causes, symptoms, and treatment. In this chapter I wish, as preliminary to the treatment of each disease, or group of diseases, as a special topic, to bring together in a short classification some of the most common causes of disease and the diseases which develop from them, the purpose of this grouping being to afford the reader a bird's eye view of the subject, and enable him to see more clearly the relations between various diseases, and their connection with common causes.

With rare exceptions, cases of disease occurring in a flock of poultry will be promptly traced by a qualified investigator to one or more of these prime causes of disease :

- 1.— Colds.
- 2.— Improper feeding.
- 3.— Improper conditions.
- 4.— Contagion.

Beginning from colds we have a group of diseases affecting mostly the organs of respiration. Most of these it has long been customary to designate by one common term — roup.

From colds also develop catarrhal conditions of the digestive organs, which are probably the real, though unsuspected cause of many cases of digestive disorders occurring where no fault can be found with the feeding.

To colds, and conditions which cause colds, are traced such diseases as catarrh, bronchitis, congestion of the lungs, pneumonia.

To colds, and conditions which cause colds, operating with contagion, are traced such diseases as diphtheritic roup, tuberculosis.

To improper feeding, or improper feeding and improper conditions, or either or both of these, and contagion, are traced nearly all the commoner diseases affecting the crop, stomach, liver, and some of those affecting the intestines. Often a derangement of one organ or function becomes responsible for derangement of other organs or functions. In fact, disorder in one organ or function, if it continues, is not likely to be long confined to that one locality, for the organs of the body are mutually dependent upon each other,

and derangement of one affects others, and also reacts upon the system in general.

Contagion as the sole cause, or as prime cause, with colds, or conditions which cause colds and reduce vitality; improper feeding, and improper conditions, as contributing causes, is responsible for a long list of troubles:—Parasites of the skin and of internal organs—for lice, mites, worms; for skin diseases, venereal diseases, scaly legs; for chicken pox, tuberculosis, cholera, diphtheria, contagious catarrh, enteritis, etc.

As we find that a case of disease is rarely simple, regular, and typical, so we find many cases of disease resulting from combinations of causes, each of which alone might produce the disease, and would produce it in some fowls, while other fowls might succumb only to the combined effects of several causes, all tending to produce that disease.

It is important to keep this in mind when referring to advices about diseases, for the first step in the treatment or prevention of further spread of many diseases is to remove the cause, or causes, and one of the most common causes of failure in the treatment of diseases which should yield readily to treatment, is to remove one cause, but leave others to continue their effects, and neutralize the effects of treatment given.

Suppose a disease is known to be correctly diagnosed, the symptoms being unmistakable. Suppose there are two or three possible causes for this disease, and that all of them happen to be present. Suppose that—as is very often the case—the poultry keeper assumes that the cause which is most conspicuous to him is the cause in this case, removes it, gives the prescribed treatment, and fails to see improvement. He may be right about the cause. That is a matter it would be difficult or impossible to either prove or disprove. But whether the other causes had anything to do with producing the disease or not, after it has developed they may tend especially to aggravate it, and prevent recovery.

Bearing this in mind the reader should carefully note every possible cause of the disease he has to deal with, decide whether or not it is present; observe whether any part of the treatment recommended applies to it, and see that every requirement is met in the treatment as he gives it.

The Importance of Being Prepared.

The effective treatment of cases it pays to treat will often depend much on the promptness with which they are taken in hand. It is not too much to say that promptness and thoroughness are the most important factors in the treatment of the majority of cases. What counts most is doing the things that need to be done to give nature a chance, and doing them without delay. In many cases a few applications or the regular use of a simple remedy in the early stages are well worth while, when, if the case is neglected until it develops to a serious stage, treatment would be troublesome, comparatively expensive, and results doubtful.

If one is going to doctor sick fowls, he should be prompt always, and in every situation where a mild disease might quickly develop into a more serious one, should be very prompt to treat it. Such promptness depends on being able to get the remedies required without delay, and unless a poultry keeper is so situated that he can get the things he may want in such an emergency at short notice, it is a good plan for him to keep on hand a few of the articles or preparations most likely to be needed. For those who wish to do this I give here such a list. It will be noted that a considerable number of the articles specified are articles kept in almost every household. Hence the number of things to procure especially for treatment of poultry is quite small.

Vaseline (veterinary vaseline preferred).	Carbolic acid.
Lard.	Peroxide hydrogen.
Glycerine.	Boric acid.
Castor oil.	Bicarbonate soda (baking soda).
Sweet oil.	Subnitrate of bismuth.
Olive oil.	Sulphate of iron.
Kerosene oil.	Tincture bryonia.
Linseed oil (raw).	Tincture spongia.
Turpentine.	Tincture aconite.
Alcohol.	Salicylic acid.
Camphor (spirits of).	Quinine.
Creolin.	Epsom salts.
Sulpho-naphthol.	Calomel.
	Chloro-naphtholeum.

With the articles in this list available from stock kept for other purposes, or on hand in small supply, the poultry keeper is prepared to treat fully nine-tenths of the cases of disease that may develop in his poultry yard, and prepared, I think, to treat all urgent cases in which treatment is likely to be profitable.

If one prefers to do so he may equip himself with a case of poultry remedies as put up by different dealers in poultry supplies, or with the special remedies advertised for special diseases, or classes of diseases, or may keep these on hand as well as the common articles mentioned in the above list. Having decided for what condition or disease he will treat, one may use a "specific" or proprietary remedy rather than follow the prescriptions given in this book, if he prefers to do so. Most of them I suppose contain the same medicinal properties as the remedies given by the authorities. Some I know are compounded after formulas furnished by physicians familiar with the diseases of poultry. A few are put up and sold by physicians who are also poultrymen.

CHAPTER VI.

Colds and Diseases that Begin with Colds.

IT HAS been customary for a great many years to group nearly all the diseases which might be considered under the heading of this chapter together under the common name roup. All these diseases were not called everywhere alike "roup," but each one of them was called "roup" by a great many people, and many applied the term "roup" to a number of different diseases, making no discrimination between different diseases exhibiting head and mouth symptoms.

In recent years there has come a tendency to make proper discriminations, and though the divisions and classifications of diseases by authorities differ somewhat, the situation in this respect is much improved, the chief drawback at present being the lack of familiarity among poultrymen with the nomenclature used. A number of diseases have no common name, and the descriptive technical names given them not meaning anything in particular to the average layman, he is generally not disposed to familiarize himself with them and make the corresponding distinctions between forms of disease. At present I find most poultry keepers calling both contagious catarrh, (to which the authorities seem agreed to limit the term "roup"), and diphtheritic roup or diphtheria *roup*; quite at a loss what to call or what to do with the diseases of this group, not characterized by a foul odor, and so often imagining a "mysterious disease," when they have nothing worse to deal with than a common cold.

The Common Developments of Colds in Fowls.

These are :—

- 1.— Common colds, called simple catarrhal colds.
- 2.— Bronchitis, or croup.
- 3.— Contagious catarrh — roup.
- 4.— Influenza.
- 5.— Diphtheria, or diphtheritic roup.
- 6.— Congestion of the lungs.
- 7.— Pneumonia.
- 8.— Conjunctivitis.

The conditions which cause colds are, in a general way, causes of these diseases. To put it another way, if the poultry keeper allows his flock to be exposed to conditions which cause colds he creates or increases the risk of introducing into his flock any or all of the above named diseases. Some of them are contagious, hence may occasionally be introduced into a flock where without contagion they would not be likely to appear; but most of them develop either directly from cold producing conditions or gradually from neglected colds.

Common Colds.

SYMPTOMS.— The symptoms of simple catarrhal colds are watery or frothy eyes, eyelids gummed together, face under the eyes puffed or swollen, sneezing, running at the nose. Not all occur in every case. Frequently but one is noticeable.

At first, and for some time in many mild cases, the general condition of the fowl seems little affected, the appetite is good, and the bird active.

If the cold continues, the bird becomes sluggish, mopes, loses appetite, the plumage is rough. If neglected, the case may develop quickly into some of the more serious complaints mentioned above. It may become chronic in a mild form. Under favorable conditions it may disappear without treatment.

CAUSES OF COLDS.— If we regard a cold as the simplest form of "temperature disease," I think we get a better appreciation of the causes of colds. A "temperature disease" may be described as the result of wrong temperature conditions. Many people look always for the causes of a cold in themselves to such matters as cold rooms or conveyances, insufficient clothing, exposure to cold winds or

rains, and if they cannot find a connection between their cold and such causes, are at a loss to know how they got it. So among poultry keepers, if the fowls catch cold, most look for the cause to low temperature conditions, and if none such can be connected with a case, many will conclude that it is something else than a cold, for the fowls were not exposed to conditions which might give them colds.

Wrong temperature does not necessarily mean low temperature. A house may be too warm as well as too cold. Or, the temperature in the house or out doors may vary to a degree disturbing to the physical condition of the fowls. Or the difference between the temperature in the house and outside temperature may be so great that the fowls, going from the house in the morning, are injured by the change.

Besides the disturbing influence of bad temperature conditions on the outer surface of the body, wrong temperature conditions may have serious effects on vital functions, and these may be either direct, as when a raw damp atmosphere irritates the nasal passages, and starts an inflammation there which may rapidly extend; or indirect, as when lack of circulation of air causes the fowls to breathe vitiated air for hours when on the roost, and poisons the fowls, reducing their vitality, and making them more susceptible to outward disturbing influences. These two illustrations do not, of course, cover all possible results of the effects of wrong temperatures internally. They do, I think, show the most common effects, and these effects I have found oftenest when the poultry keeper is trying to keep his fowls warm.

I cannot here go into a discussion of the relative merits of housing systems. For that, readers who need it to convince them of the difficulties of making tight houses work as in theory they are intended to work, are referred to files of *Farm-Poultry* for 1902—5, or to the lesson which will treat of the subject in the series for 1906. I will only say here that during the late summer and early fall the requests for treatment of fowls or chicks that have colds that come to me have been for years almost without exception from people who were keeping too many fowls in a house, or keeping the house closed too much; while the correspondence about colds later in the fall and winter comes largely from people

whose poultry houses are damp though warmly built, kept tightly closed except on warmest days and parts of days, and so the fowls much of the time breathe air that is chilly and foul, when the house is warmed up quickly by the sun have a rapid change to hot foul air, and the temperature conditions, as they affect the fowls, both outwardly and inwardly, are often bad during the greater part of every twenty-four hours.

I have put special emphasis on the causes just discussed because they are so generally unsuspected, because often in subjecting his fowls to conditions which produce these causes of colds the poultry keeper thinks he is doing the best and all that can be done to prevent colds. Having thus called special attention to a class of causes of colds which otherwise the reader might think uncommon, and not give enough consideration when looking for the causes of colds in his flock, I give here a list of causes of colds, with some illustrations which may make the situation plainer in a case under consideration :—

Causes of Colds.

1.—EXPOSURE TO COLD, DAMPNES, AND COLD WINDS.

Exposure in such cases means continued exposure, or exposure after cold, dampness, or wind begins to make the fowl uncomfortable. On the same basis we may place inadequate provisions for neutralizing the effects of temporary exposure.

The degree of exposure which fowls can stand without suffering varies just as with men. The condition of the fowl is also a factor. A fowl may take cold easily at one time under circumstances which at another time would not have such effect.

Within limits, exposure is beneficial provided suitable conditions are made for counteracting any bad effects from exposure.

Thus fowls of all kinds, even small chickens, are better for a little while in the cold outdoor air in winter if, when cold, they have a place to go from it where they will soon become warm again either by the warmth of the place or by exercise; but if, when cold, they can go only to a place where the heat is insufficient to restore bodily heat quickly, and where there is no inducement to exercise, they are likely to take cold because of exposure.

Fowls may run on the snow, or on a thawing day in winter or spring paddle about in icy water and be none the worse for it, if

they have opportunity to go when they wish to a floor well covered with leaves, broken straw, or other warm litter in which their feet quickly become dry and warm, when, if they had to wait for their feet to become dry and warm on a hard earth or board floor, their feet might remain cold so long, or dry so slowly, that meantime they would take cold.

Fowls may run about in cold raw winds and be none the worse for it—as long as they seem satisfied and comfortable; but when they begin to be distressed by the wind, they are in a condition which, if it continues, may quickly develop a cold or something worse.

2.—EXPOSURE TO DRAFTS.

Exposure to drafts usually causes at first a gumming of the lids of one eye, or a slight puffing of one side of the face. In most cases such a symptom indicates a strong current of air, possibly a very small one, striking the head of the fowl continuously for some hours. Into a warm house such a current of air may come through a very small opening when the atmosphere outside is much cooler. When the temperature inside and out is nearly the same there can be little movement of air through small openings, hence no draft of any consequence. If only one side of the head is affected, investigation is likely to show that the fowl roosts where such a draft would be likely to strike the affected side of the head from the side. If both sides of the head are affected alike the draft is more likely to go under, over, or about the fowl, though under such conditions only one side may be affected. Exposure to considerable drafts or currents of air surrounding the bird is likely to produce general symptoms of cold simultaneously with such local symptoms as may develop.

3.—CROWDING IN THE HOUSES, AND IMPROPER VENTILATION.

The effects of breathing bad air under these conditions were considered on page 43. The more conspicuous results of crowding and lack of ventilation are seen when fowls, leaving an overcrowded and overheated house for the cooler outer air in the morning, immediately develop all the pronounced symptoms of bad colds, watery eyes, and running nostrils, sneezing, ruffled plumage, inactivity, and lack of appetite.

4.—CLOSING HOUSES TOO MUCH AT NIGHT IN THE FALL.

Whatever may be said of the advisability of using open houses after real winter weather sets in, no good argument can be made for closing doors and windows before water would freeze in the house in the fall, or keeping them closed under similar conditions in the spring. The house should be so constructed that there will be a general movement of the air all through it, the roosts being placed, not in a dead air recess or box, but at one side of the room, where the atmosphere will partake to some degree of the general motion of air in the house, but not with the full force of its motion. What I mean is more easily illustrated by a water example. If you pour water into a pail, the water falling in the center of the pail, there is a very rapid motion of the water at that point, a much less rapid motion elsewhere. In a stream there is a rapid motion of the current out in midstream generally, while along the banks the movement of water is much slower unless the winding of the river here and there sends the current from the center toward one bank or the other. Now the air may blow directly into a chicken house and on the hens on the roosts, but if the wall back of them is tight enough to prevent any free passage of air through it, and the space in which the roosts are is low enough and narrow enough, the air entering strikes a cushion of air which is displaced by it slowly and without creating currents injurious to the fowls. In the ordinary poultry house, four to six feet high at the rear wall, with pens twelve to sixteen feet wide and ten or twelve feet deep, if the roosts are along the rear wall the entire front may be open, and no wind that will blow in is likely to hurt the fowls on the roosts. If roosts are at one side of the pen, the front wall tight to a point between one and two feet beyond the front roost will prevent a movement of air injurious to the fowls, though all the rest of the front is open. For two years I have used from early April to the latter part of November, a two pen house facing nearly south, with a door in the middle of the north wall. This door is rarely shut day or night during the period mentioned. The roosts extend along the rear wall, and are protected by a partition on either side of the door projecting three to four feet into the pen. Any northerly wind may blow through with full force, but I have not had a single case of cold in the house.

5.—SUDDEN CHANGES OF TEMPERATURE.

With a poultry house built facing the south, and built as low and with rear and end walls and roof as tight as is customary no special precautions need be taken against any but extreme or radical changes of temperature. In acting on this advice the reader should consider that changes of weather conditions to cold or bad after a long period of warm, dry, fine weather, may be relatively extreme, though not actually as severe as changes which under other circumstances might little affect the fowls. Fowls get accustomed to changing temperatures — perhaps not as completely as to high or low average temperatures, but still it may be noticed that fowls somewhat exposed to weather changes are much less unfavorably affected by them than those too carefully shielded from inclemencies of the weather.

Extreme changes of temperature may, as a rule, be anticipated long enough beforehand to enable the poultry keeper to take such steps as are needful to counteract their effects. Feeding heavily of heating food is one of the best ways of meeting a sudden drop in temperature, and if fowls are susceptible to cold they may also be shut in their houses before the temperature falls. Then the air inside being warm, and the cold air excluded, the temperature in the house falls more slowly, and the fowls adjust themselves better to the change.

Treatments for Colds.

In many mild cases of colds the removal of the cause is all that is necessary, especially in warm weather and with vigorous, healthy stock.

With the same general conditions, less rugged stock might profitably be given a tonic, condition powder, or stimulant. As far as possible, it is advisable to give flock rather than individual treatment.

Seasoning the food highly with red pepper is beneficial generally in cases of colds.

The red pepper pods chopped into small bits and fed either separately or in a mash, are also good — better, I think, than the ground pepper.

Onions are good in colds, and the red pepper pods used as suggested above, and onions in the mash, or raw, are both considered

good for the prevention of colds. Such preventives it is most desirable to use when conditions productive of colds prevail, as, for instance, long periods of changeable weather. Raw onions, unless fed in very small quantities, will flavor both the meat and eggs of fowls, but I have never noticed any taste after feeding cooked onions; nor did I ever have a customer complain of onion flavor when I was feeding cooked onions.

A remedy for colds used by many poultrymen is: — “A tablespoonful of clear lard, half a tablespoonful each of ginger, cayenne pepper, and mustard; mix well together and add flour till the whole is of the consistency of dough, roll into slugs about the size of the little finger.” A batch of these slugs may be made up, dried so that they will not stick together, then put in a covered can or box, or in a bottle. They will keep for several years. They may be administered by putting down the fowl's throat, or simply placed before the fowl. If its appetite is good it is quite sure to eat several pieces as large as large beans.

Creolin may be given in the drinking water—a teaspoonful to a three gallon bucket of water.

Another good simple remedy is hard soap. Take a piece of common hard soap and dissolve in water to the consistency of soft soap. Give this in the drinking water, a tablespoonful to a gallon of water, giving no clear water while this treatment is used. The dissolved soap can be kept in a bottle or jug to use as needed.

Woods recommends this flock treatment for colds: Drop twenty drops spirits of camphor on a little sugar, and dissolve the whole in a pint of drinking water.

When a cold becomes serious, stronger medicines are needed, and usually it is best to give local treatment to the parts of the head showing symptoms. The mouth and nostrils should be cleansed, and applications made to reduce any puffing or swelling of the face which may appear. Any of the following washes may be used:—

Weak alum water.

Carbolized water—2 per cent solution, that is, 1 part carbolic acid to 50 parts water.

Sulphate of copper—a teaspoonful to a quart of water.

Hydrogen dioxide and water, equal parts.

For external application to the face and eyes, any of the above may be used, but the following have more continuous effects :

Pure lard.

Carbolated vaseline.

Creolin, 1 part; vaseline, 50 parts.

Turpentine, 1 part; glycerine, 6 parts.

For internal treatment in serious colds, Salmon recommends this :— “ Gentian root, 4 drams ; ginger, 4 drams ; sulphate of iron, 2 drams ; hyposulphate of sodium, 1 dram ; salicylate of sodium, 1 dram. Pulverize and mix. Give three or four grains a day for a medium sized fowl.

Woods recommends a mixture of ten drops each tincture aconite, tincture bryonia, and tincture spongia in an ounce of alcohol. Give in the drinking water—a teaspoonful of the mixture to a quart of water.

Bronchitis, or Croup.

What Woods calls croup appears to be the disease our other authorities call bronchitis. Sanborn makes a distinction between the acute and chronic forms of bronchitis; the latter is, I believe, substantially the same thing as whooping cough in human beings.

SYMPTOMS.—A case of bronchitis usually presents with the general symptoms of a bad cold a peculiar symptom which almost invariably identifies it. This symptom is a rattling or whistling sound when breathing. Unnatural breathing like this not accompanied by cold symptoms is sometimes chronic in fowls. Such cases usually result from bronchial troubles which leave the wind-pipe in bad condition, or, perhaps from an accident—as in swallowing something too large for the throat. In these cases the fowl seems otherwise all right, but the noise it makes in breathing is very irritating to most people. In acute bronchitis or croup, we find “rattling in the throat,” with symptoms of severe colds, and in the chronic form there may be the rattling in breathing and coughing up of mucus, the birds between the spasms of coughing appearing very well. My reasons for supposing that many cases exhibiting symptoms that in a general way resemble symptoms of bronchitis are cases of whooping cough, are these: A number of times correspondents have reported cases supposed to be bronchitis which did not seem to respond to any of the treatments for bron-

chitis. The fowls had occasional paroxysms of coughing which sometimes exhausted them for the time, but most would quickly regain vitality and seem all right until the next attack of coughing. Then, all at once, it would be noticed that coughing had ceased and the bird was permanently well again. Exact notice was rarely taken of the period of the disease, but it seemed to have about the same duration as whooping cough, and in general to present the same features.

If my surmise is correct, this form of "bronchitis" is not serious. The difficulty, however, is to distinguish between it and other forms in the early stages, and the best way to do would seem to be to assume in the beginning that the disease is or may become acute, and treat as for acute bronchitis. Then if the case becomes chronic, separate affected birds, and give warm quarters and good care, without special medical treatment.

CAUSES.—Any of the causes of colds may develop bronchitis. The disease is also sometimes developed by the irritation of dust and gases or vapors. Sanborn mentions the use of airslaked lime in poultry houses as a cause of bronchitis.

TREATMENTS.—For early stages :—

1.—One drop tincture of aconite every hour for five hours, then one in three hours. Keep the bird in warm moist air; feed hot mash at least half bran. (Sanborn).

2.—Salmon recommends the inhalation of steam or vapor from boiling water containing hops, or a small quantity of carbolic acid or creolin. Give with the food two grains of black antimony twice a day, the food to be soft and cooling — stale bread or a mixture of bran and middlings moistened with milk. For drink he suggests a little flax seed steeped in hot water, or honey or gum arabic added to the drinking water.

3.—Woods prescribes the aconite, bryonia, and spongia mixture mentioned on page 49, for mild cases of croup.

FOR MORE SEVERE CASES.

4.—For a case which in its early stages looks like a severe case, Salmon advises giving ten drops spirits of turpentine in a teaspoonful of castor oil, repeating the dose after five or six hours, but not continuing it after signs of purging appear. For very difficult

respiration he advises giving from three to six drops of either the syrup or the wine of ipecac.

5.—For cases that do not respond to the treatment given at No. 4, Woods gives a one one-thousandth of a grain of arsenite of antimony night and morning until a stage of marked improvement is reached, and for patients in danger of suffocating, recommends inhalations of steam from boiling water, and bathing the throat with cold water.

6.—For chronic cases Sanborn recommends “Dumas Antimalarial” pills, made of strychnine, iron, and quinine, to be given one pill each night and morning *for weeks*.

Both of the remedies in Nos. 5 and 6 are hard to get; few drug stores keep them. Both treatments are to be continued for quite a long time, and necessitate individual handling of each fowl affected twice daily. This excludes them from one economic rule for the treatment of disease.

Roup — Contagious Catarrh.

SYMPTOMS.—Common colds are not contagious, though they may be general throughout a flock, because the conditions which give one fowl a cold are likely to give many colds. There is a more virulent form of disease with catarrhal symptoms which is contagious. In it the symptoms of common colds are generally much aggravated, and the discharge from the head has the peculiar offensive odor known among poultrymen as “the roup smell.” One familiar with this odor may often detect the disease through it before any other symptom is noted. With the development of the disease the discharge from the head becomes thick, sometimes obstructing breathing through the nostrils. Then, the fowl breathing through the mouth, the tongue and mouth become dry, and on the tip of the tongue forms the scale which many call “the pip,” and think a distinct disease. The thick yellow discharge may collect in the passages of the head, and especially in the sockets of the eyeballs, in such quantities as to force the eyeball out of place and permanently destroy the eye, even if the fowl recovers from the disease. The discharge dries in crusts on the beak and about the nostrils, soils the feathers of the fowl wherever it comes in contact with them, particularly on the wing where the head touches

it as the bird rests at night. The comb and wattles generally become a dark angry looking red. The bird is feverish, and if it can see is likely to stand near the water pan drinking frequently and polluting the water, and through it spreading the contagion to its mates.

The period of development varies. Woods says that in acute cases the disease develops in from two to five days after infection. A great many cases are mild, though the roup smell is present in their earliest stages, and some take a mild chronic form and run for a long time. It is these mild cases that cause most of the trouble with roup. The fowls having them, though not seemingly very sick themselves, carry the contagion about, and wherever they may be outbreaks of roup will appear at frequent intervals.

CAUSE.—Authorities are agreed that this form of roup, to which it is more and more the practice to restrict the use of the term "roup," is caused by a specific germ, but as to whether the germ is peculiar to the disease, they are not agreed. Some think it is; others think that the same germ causes diphtheria or diphtheritic roup, the difference between the two being a difference in development in different fowls under different circumstances. However that may be, the tendency is to treat them as distinct, and to call the form of roup with diphtheritic symptoms simply diphtheria.

The catarrhal roup contagion is spread mostly through food and drink. In fact it is so generally spread by fowls eating and drinking together that practically no other way need be considered. Fowls having symptoms of roup must not be allowed to eat and drink with well fowls. When separated for this purpose other ways (if there are such) of communicating the disease cannot operate.

TREATMENT.—Treatment of pronounced cases of roup is unprofitable. The risk of retaining the disease in the yards in fowls apparently cured is too great, and the time necessary to give to the treatment of bad cases is generally worth more than the value of the fowls saved.

The best thing to do when roup is discovered in a flock is to kill and burn or bury deep every bird which seems *sick*, and separate at once from the flock every bird showing any symptoms of cold, and treat as for bad colds,—the extent of the treatment being deter-

mined by the symptoms in each case. Many birds will require nothing more than one of the general remedies given for colds. Some may need a few individual treatments, washing the mouth and throat, and anointing the face and the comb about the nostrils. The cure of bad cases of roup depends more on frequent individual treatments and on good nursing (including forcing nourishing food into the crop if the sick fowl cannot or will not partake of food itself). I have cured many very bad cases, but quit treating them years ago, because I found that as long as I cured roup I had more roup to cure.

Influenza.

So far as I have seen, Woods is the only writer who has described this disease, others making no distinction between it and roup, diphtheria, and severe colds. Woods describes it as "epizootic," or "grippe" — "a contagious germ disease often closely associated with roup," but in his opinion quite distinct from either roup or diphtheria. I judge from his description of symptoms and statements of causes that he would give this name to many cases of disease which some poultrymen have been accustomed to call "distemper," and consider either a form of roup or a chronic cold from which roup might develop. The symptoms he gives appear also to be identical with symptoms produced when several causes of colds operate simultaneously; as, for instance, when fowls are subjected to wrong or changeable temperature and bad hygienic conditions. I have often had correspondents report cases with these symptoms from overcrowded flocks with the first hot weather of summer, or from newly purchased stock shortly after its arrival. Briefly stated, the symptoms are of a sudden and severe cold, with high fever, generally diarrhea, and extreme debility. In very severe cases death may ensue within a few hours after the fowl is observed to be sick. Usually the bad cases linger for a day or two, while those that recover run for a week or ten days. Treatment the same as for bad colds.

Diphtheria — Diphtheritic Roup.

SYMPTOMS.—The brief description of the symptoms and course of this disease given by Dr. Woods in an article on "Roup and Roup Colds," published in *FARM-POULTRY*, Oct. 15, 1902, is the most satisfactory I have seen, and I quote it here entire:—

"It is sometimes difficult to tell just when roup leaves off and diphtheria begins, the two are often so intimately associated. Diphtheria or diphtheritic roup is a contagious germ disease. It may or may not have the 'roup smell.'

"A fowl in apparent good health becomes suddenly ill, loses appetite, and appears dumpish. Eyes and nose may or may not show a frothy or glairy discharge in the early stages of the disease. Fowl is hot, comb is hot and deep red, and later becomes pale and drooping. May be cough with sharp 'pip' sound, or may be difficult breathing and lividness of face and comb. Examination of the throat shows much redness and inflammation, with small pearly or wash leather colored patches on the back part of the throat or about the cleft of the palate. These patches increase rapidly in size, and have a tendency to run together. The membrane may grow rapidly, filling the mouth and throat, and causing death from suffocation. The membrane is apparently a part with the mucous membrane of the throat, and any attempt to remove it will result in bleeding. (If the membrane does come away easily, and does not have a bleeding surface, the disease is not diphtheria). The fowl shows signs of great weakness from constitutional poisoning. The membrane may extend into the windpipe and cause death from suffocation, or it may extend to the mucous membrane of the nasal passages and to the eyes, causing swollen head. The breath always has a very fetid odor. This is a decidedly different odor from the 'roup smell.' Roup may have any or all of these symptoms common to diphtheria, but does not have the following sequelæ which belong to diphtheria: Paralysis of the heart may appear at any stage of diphtheria, and cause death. Cases which have apparently recovered may develop paralysis of the throat, which prevents swallowing. The fowl may lose the use of the legs or wings. The paralysis is not necessarily permanent. One attack of diphtheria predisposes to another, and a fowl should not be considered well until at least six months have elapsed since the last symptoms were observed, with no recurrence of symptoms."

TREATMENT.—Treatment of diphtheria is more difficult and less often successful than treatment of roup (contagious catarrh). Only individual treatment will answer, and the treatment of a few cases would take up a considerable part of a man's time while continued.

While urgently advising readers not to "doctor" cases of diphtheria, but to kill and properly dispose of the bodies, I give the treatments prescribed by Woods and Salmon, the first being a verbatim quotation from the article mentioned above, and the second an abstract of the longer statement in Salmon's "Diseases of Poultry."

(*Woods*)—"Cleanse the mouth and throat frequently with a solution of creolin (one teaspoonful in half a glass, four fluid ounces, of water). In cases where there is a thick tough membrane the swab (a bit of absorbent cotton twisted about the end of a toothpick) may be moistened with straight creolin and then held for a few minutes against the membrane, and moved gently over it. Don't drop any straight creolin into the windpipe unless you want to kill the patient. For internal medicine give a one one-hundredth of a grain tablet biniodide of mercury (or same strength protiodide of mercury) four times daily until the membrane begins to disappear, and then gradually reduce the dose to one tablet daily. Continue the remedy for at least a week after the throat clears up. During convalescence the bird will need a tonic. Give five drop doses of Fellows' compound syrup of hypophosphites made into a pill with bread crumbs, three times daily."

Dr. Salmon mentions a number of treatments for diphtheria in fowls:—

- 1.—Apply a two per cent solution of either creolin or pure carbolic acid in water to the diphtheritic spots three times a day, injecting a little of the solution into the nostrils; remove the diphtheritic membranes as soon as it can be done without bleeding, and continue the application of the remedy.

- 2.—Apply tincture of iodine to diseased spots in the mouth, and a solution of salicylic acid (1 grain in an ounce of water) to the eyes.

- 3.—Apply boric acid, 15 grains to an ounce of water, to eyes, nostrils, and mouth as often as convenient.

- 4.—Remove membranes, apply boric acid solution, then cover affected parts with flowers of sulphur.

- 5.—Dissolve 35 grains of potassium and 2 grains salicylic acid in one ounce of water, and add one ounce of glycerine. Apply to the diphtheritic spots two or three times a day, and also give internally a teaspoonful to a fowl.

6.— One grain each cayenne pepper, sulphate of quinine, sulphate of iron; mix and make into pills with a small quantity of syrup. Give the fowl at one dose.

7.— Mix 45 grains sulphate of iron and 1 dram finely pulverized carbonate of soda with syrup or honey to give proper consistency. Divide into fifty pills.

As these last two prescriptions are especially recommended for the chronic or undeveloped form of diphtheria, I presume that the dose should be repeated at intervals, but no specific instructions on that point are given, perhaps because the poultry keeper must in each case use his judgment about continuing treatment, giving it until improvement is noticed.

Having given these treatments for those who will try to doctor diphtheria in fowls, I would again urge upon the reader, as the better policy, never to try to treat a case of diphtheria, but to kill every fowl in an affected flock which shows any symptoms of the disease, for fowls apparently cured are likely to have other attacks, and the risks of the disease are too great to take chances with it.

Congestion of the Lungs.

This disease causes a great many of the sudden deaths and deaths after very short sickness which puzzle poultry keepers. It develops oftenest in young stock, particularly in chicks reared in brooders. Any stock exposed to severe changes of temperature is liable to it, and, of course, the more delicate fowls, and fowls out of condition, as when molting, are especially liable to take it when exposed to sudden changes or rigorous weather.

SYMPTOMS.—Difficult and rapid breathing, comb dark red or bluish, bird appears to be in a semi-comatose condition, bloody mucus may discharge from the mouth. A post mortem examination of the lungs will show them full of blood and very dark in color.

CAUSES.—Exposure to cold, chilling. Salmon says it also occurs in overfed birds, especially cage birds. The first causes given are those poultrymen should look for first when seeking to ascertain the cause of a case of sickness supposed to be congestion of the lungs. Overfeeding with fowls is more likely to develop other disorders before congestion of the lungs.

TREATMENT.—The course of the disease is so rapid that no treatment is likely to be successful, and the poultry keeper's attention should be directed rather to the prevention of further cases. The conditions which develop one or more cases of congestion of the lungs in a flock are likely to reduce the vitality of many others in the flock. Preventive treatment should look out first for the comfort of the fowls, then see that they have an abundant, varied, rich, and mildly stimulating ration.

Many cases of congestion of the lungs occurring among brooder chicks indicates something wrong with the brooding, either in the brooders or in the management. Sometimes the trouble is bad in the late winter and early spring, disappears almost or altogether in warm spring and early summer, and reappears with extreme hot weather. If one is losing many brooder chicks it is well to have some of those that die examined to discover the condition of the lungs, and if the fault is with the brooding it must be remedied. Otherwise the poultry keeper might as well quit hatching.

Pneumonia.

Dr. Salmon is, I think, the only one of the popular writers on poultry diseases who has made a distinction between pneumonia and congestion of the lungs. The others include both in pneumonia. Pneumonia, or inflammation of the lungs, Salmon describes as an alteration of the lungs one step beyond congestion. Says he: "If a bird affected with congestion of the lungs does not die or recover within a few hours the disease may develop into pneumonia. In this disease there is not only a distention of the blood vessels, as with congestion, but there is thrown out from these vessels a liquid which fills the air cells, and, by coagulating, forms a semi-solid gelatinous substance that excludes the air and renders the lungs useless for respiration."

SYMPTOMS.—Ordinary observation would note no difference between outward symptoms of pneumonia and congestion of the lungs.

CAUSES.—The authorities who make no distinction between congestion of the lungs and pneumonia, give the causes for pneumonia substantially as they have been given in this book for congestion of the lungs. Sanborn states that the belief grows that the

disease is contagious. Salmon, in stating the causes, makes the matter plain. He says it is supposed that to produce pneumonia there must be with the causes that produce congestion of the lungs the agency of a germ, a species of bacteria, harmless when the lung is in normal condition, but harmful when conditions which cause congestion are present.

TREATMENT.— Few fowls are worth the treatment required to effect a cure, and a cure is so uncertain that it is rarely worth while to attempt to treat pneumonia. In this, as in all hopeless cases, or cases unprofitable to treat, the poultry keeper, having made up his mind on that point, should promptly put the fowl out of its misery.

Treatments prescribed are :—

1.— “ Keep the bird in a room of about 70 degrees, with steam from boiling water if possible. Give every six hours one grain phenacetin, and one grain sulpho-carbolate of zinc, mixed with bread crumbs enough to make a pill. Feed on raw egg and milk. Do not give quinine or spirits. Tincture aconite in the drinking water, or one drop every two hours in the egg and milk, will help control the hard breathing. If successful in saving the bird, build up its strength with tonics such as nux vomica or quinine.” (Sanborn).

2.— “ The bird should be immediately housed and kept warm. Counter irritation must be applied over the region of the lungs by wetting the skin under the feathers on the back with tincture of iodine. Stimulants should be administered three or four times a day—two drops of spirits of camphor and ten drops of brandy in a teaspoonful of warm milk. Soft, nutritious diet, especially chopped beef, is necessary. Beaten egg and port wine is also useful. Three or four spots of chlorodyne may be given in a teaspoonful of linseed tea to relieve the more distressing symptoms; and ultimately, if the case progresses favorably, mineral tonics and cod liver oil are favorable in establishing convalescence.” (Hill).

3.— “ Place bird in a warm room and cover with a piece of blanket, leaving the head uncovered that it may have plenty of air. Give linseed tea frequently in small quantities. To make this tea: Pour a pint of boiling water on an ounce of flaxseed, and keep hot, but not boiling, for two hours. Strain to remove the seeds. The liquid may then be used as a drink, or medicines may

be given in it. Dissolve enough nitrate of potash in the drink to give the bird about one grain three times a day. If the bird is failing and becomes sleepy, with comb turning dark, mix fifteen drops of tincture of digitalis with one ounce of water, and give ten drops of the mixture every two hours. To give medicine use a medicine dropper, and be careful to avoid getting it into the air passages. When the bird begins to improve, give a grain of quinine, or ten drops of cod liver oil twice a day." (Salmon).

Conjunctivitis — Sore Eyes.

After colds or mild cases of roup, (and sometimes from other causes), the eyes of fowls may be diseased. When the trouble follows colds or roup it is usually regarded as a symptom of the original trouble, which continues though the fowl is otherwise improved, and is often allowed to go on for some time without the special treatment it requires. When it develops from other causes it is often supposed to be roup, and treatment for that is given. Many cases recover without treatment, and many cases of eye trouble due to other causes, given a roup treatment recover, and the poultry keeper thinks he has cured a case of roup, and finding some after effects, especially in breeding, not as serious as is usual with true roup, is apt to be more careless about roup than is advisable. It is, as a rule, only when roup remedies fail that the stranger to this disease begins to make inquiries about it. The authorities on diseases are in part to blame for this, for of them all Woods has been the only one to give it appropriate notice.

SYMPTOMS.—Gumming of eyelids, and mucus discharge from the eyes. Where there is a discharge of pus from the eyes inflammation of the cornea may develop. This is called *keratitis*. Woods says that if noticed early a small opaque white spot may be seen over the pupil. Whether the lids are gummed or not, the fowl keeps its eyes closed, the light being painful. Severe inflammation and ulceration may destroy the sight.

CAUSES.—Causes of colds, roup, diphtheria, irritating dust in the eyes, injuries to eyes.

TREATMENT. (Woods).—For simple conjunctivitis, give ten or fifteen drops tincture of euphrasia in a pint of drinking water. Bathe the eyes with mild solutions as used for colds, or anoint with

two per cent creolin mixture with lard or vaseline. For purulent cases give ten to fifteen drops tincture of pulsatilla in the drinking water, and both wash and anoint the eyes with the solutions and ointment mentioned.

For keratitis :— Bathe eyes with cool water and a little hydrogen dioxide; then anoint the inner part of the lids with an ointment made of ten grains finely powdered iodoform in an ounce of vaseline. Cleanse the nostrils, and dust the nose and cleft of palate with the following powder: Equal parts of pulverized camphor, boracic acid, and subnitrate of bismuth well mixed.

CHAPTER VII.

Diseases Due to Improper Foods and Feeding.

THE diseases discussed in this chapter probably cause more losses and more unproductiveness among adult fowls than all other classes of diseases. Some of the most common of them have no conspicuous symptoms, and the condition of the fowl may not even be suspected by an unsuspicious or ordinarily observant poultryman until revealed by post mortem examination of fowls to find a cause for death.

Among young chickens losses due to improper temperature for brooder chicks, and to exposure for chicks being reared by natural methods, may be more numerous, but losses from bad feeding are often heavy in the first few months, and in a great many instances the combination of wrong temperature and bad feeding causes heavy losses when neither cause alone is bad enough to have very serious effects.

The bad effects of an improper food, or of good food fed under improper conditions, may be instantaneous and marked, or they may develop so slowly and obscurely that no outward symptom warns the feeder that he is going wrong. Old poultrymen are frequently found who have fed wrong for years, had the same trouble come from it every year, and yet could not be convinced that the fault was in their method of feeding, because they could not see the connection of cause and result.

Digestive disorders may be due to other things than the food, or the way of feeding. Worms, by obstructing the digestive processes, may develop diseased conditions of one or more of the organs of

digestion. Contagious germ diseases attacking the intestines have somewhat the same effect. Hence if the food and feeding conditions are beyond criticism, and still something has plainly gone wrong somewhere in the digestive system of the fowl, (and especially if several or many fowls are affected), the poultry keeper should look for symptoms of worms and contagious germ diseases.

In a general way we may divide diseases due to improper foods and feeding into two classes :—

- 1.—Diseases produced by taking into the system things which are themselves injurious.
- 2.—Diseases produced by the inability of the system to utilize proper food materials either because improperly served, or because the organs are weak.

In a general way these divisions correspond to the division previously indicated according to prominence of symptoms, injurious articles producing plain symptoms, usually very quickly, while diseases of the other kind develop slowly, and rarely present any noticeable symptoms. In a general way it may also be said that fowls at liberty are more likely to contract the more acute digestive troubles, while the chronic forms are more commonly found among fowls kept in confinement. These general differences are indicated that the reader may know what kinds of digestive disorders his method of poultry keeping makes it most necessary to guard against. Fowls at liberty, particularly in towns where they have access to all sorts of refuse, are especially subject to diseases of the crop, stomach, and intestines, resulting from eating filthy, putrid, poisonous, or irritant substances. Fowls at liberty on farms, as most farm fowls are, may occasionally get such substances, but the farmer is more likely to take proper care of them than is the city resident who has no animals of his own to be injured, and is indifferent as to what may happen to stock belonging to his neighbor.

Fowls in confinement are most subject to indigestion and liver troubles.

Diseases of the Crop.

SYMPTOMS AND CAUSES.—The crop may be regarded as the first stomach of the fowl. Into it the food passes first, and in it is retained for a time while being softened and made fit for further digestive processes. Any serious interference with the functions of

the crop is likely to cause the retention of food in it, and to produce the condition which poultrymen call "crop bound." This crop bound condition may be due to any one of several causes :

- 1.—The crop may contain indigestible material — most frequently long hay — which the fowl can neither pass through to remainder of the digestive tract, nor expel through the mouth.
- 2.—The crop may be so crowded with digestible material that its walls are incapable of the action necessary to force the food onward.
- 3.—The passage from the crop may be obstructed.
- 4.—Enlarged, pendulous, or slack crop.
- 5.—Inflammation of the walls of the crop may occur either from irritating substances taken into it, or from food retained too long in it. This latter condition is often a result of disease further down the digestive tract, an obstruction in or failure to act of any part of the system necessarily reacting on the other parts.

Impaction of the Crop.

It is sometimes a question in my mind whether anything but metal should be called indigestible for a fowl with robust digestive power. We say that the dry hay the fowl may take into the crop causes impaction, but the fact is that it is only in occasional instances that it does cause impaction. Far oftener the fowl eats dry hay or corn fodder till its crop is bulging, and is never seen to be at all the worse for it. I have seen this so often, that though an occasional case of impacted crop might properly be attributed directly to the overloading of the crop, the occurrence of a number of such cases in a flock at about the same time, would suggest that the real cause was indigestion, or weak digestion. I have repeatedly given fowls which all their lives had been handled to make and keep digestive organs in first class condition all other conditions for developing cases of impacted crops, but have never been able to get a case that way.

Impacted crop occurs oftenest when hens get out on the ground in the spring, and eat the dead grass to the distention of the crop, but may occur at any time as indicated in the categorical list of causes. Some people tell me that their fowls will become crop

bound at any time on any dry litter they may use in the scratching floors. When this happens the trouble is unquestionably due to indigestion, or to an abnormal appetite produced by indigestion or malnutrition. Where a crop bound condition develops it should be treated in the individual case, and if it is to any extent epidemic general measures should be taken to correct errors in feeding, and to improve digestion.

TREATMENT.—"Cause the bird to swallow a tablespoonful of castor oil; then knead carefully the hard mass. If successful in softening it, hold the hen head downward and try to push the substance along and out of the mouth. If swelled grain is the cause of the trouble, you will probably be successful; but if matted hay or cornstalk makes up the mass, you will have to open the crop.

"If someone can hold the bird for you it will make the operation easier. Pluck out a few feathers and then cut through the skin over the crop a line about one inch long. This cut should be in the medium line of the body. Then make an incision three-fourths of an inch long through the crop. The distention of the crop will cause the opening to gape, and the mass will be in plain sight. With toothpicks, blunt pointed scissors, tweezers, or similar tools, take out the contents of the crop. This done, run the finger into the crop and make sure that there is nothing remaining to obstruct the outlet to the organ. When sure all is right, take three or four stitches in the opening in the crop, making each stitch by itself, and tying a knot that will not slip. Then do the same thing to the cut in the skin. For stitches use white silk (or if nothing better can be obtained) common cotton thread, number sixty. Keep the bird by itself for a week, feeding soft food."—(*Farm-Poultry Doctor*).

While the above treatment may be followed as given, these few additional suggestions by Salmon (*Diseases of Poultry*) may profitably be applied. Instead of castor oil sweet oil may be used, administering a small quantity at first and other small quantities as they seem to be needed to assist the process of softening the contents of the crop by kneading.

In making the cut to open the crop make it rather high on the crop, that the pressure of food on it while healing may be as light as possible.

After removing the contents of the crop, wash the wound with a solution of carbolic acid, five drops to one ounce of water.

After the operation give no food, and only a little water to which a grain or two of salicylic acid has been added, for twenty-four hours. Then give milk only for two or three days, after which gradually change to mush and more solid food.

The operation is not a difficult one, and is usually successful if the operator is careful, and at all deft with his fingers and in the manipulation of the knife, but if bunglingly and carelessly performed, or if the fowl is neglected or fed hard food after the operation the cuts may not heal properly.

Enlarged Crop.

SYMPTOMS.—The crop sometimes becomes very much enlarged and prominent, but hanging loosely, not bulging and hard, as in impaction of the crop. This form of permanent enlargement and displacement is called enlarged crop, slack crop, or pendulous crop. It may exist with little inconvenience and detriment to the fowl.

CAUSES.—Sanborn says that this condition of the crop results from irregular feeding; that the fowls having had no food, or an insufficient supply for a day or two, overload the crop at the first opportunity. This may be the cause in a great many cases, yet it can hardly be the sole cause, for cases of slack crop are not infrequently found in fowls that have been well and regularly fed. Hence it seems to me that Sanborn's statement requires some explanation and addition to make it cover the causes.

If a fowl is fed heavily, and from any cause (as indigestion) the crop remains full and distended too long, though this condition may in time be relieved in the natural way without interference of the keeper, the effect on the crop is the same as if the overloading had occurred because of irregular feeding. If this condition is repeated several times the walls of the crop become in some degree permanently distended, and if the fowls are fed heavily without much exercise the tendency is to steadily exaggerate this condition.

Again, simply as a result of heavy feeding without sufficient intervals between meals, and without sufficient exercise some fowls develop at the same time a "baggy" crop and a "baggy" abdomen.

TREATMENT.—Only in case of a very valuable bird is treatment worth while. Sanborn advises operating as for impaction, making cuts three times as long, clean out the crop, then cut out of the most enlarged part of the crop a piece of skin from one to two inches wide and about two inches long, shaped like a diamond or a pair of (). Sew edges together with silk, and give after treatment as in crop bound cases.

Inflammation or Catarrh of the Crop.

This is a disease which rarely develops independently, for the causes which produce it will almost invariably develop diseased conditions in other parts of the digestive tract at the same time. It occurs quite regularly with gastritis.

SYMPTOMS.—The crop is distended with food, liquid or gas; is not hard, but fluctuating to the touch. There is belching of gas, efforts to vomit, and the crop contents may have an offensive smell. The fowl is alternately restless and dull, the breathing spasmodic. It loses appetite and strength.

CAUSES.—Eating indigestible or irritant substances. This covers quite a long list from foods containing indigestible particles, or foods so damaged that a slow irritation is set up, to foreign and poisonous substances which quickly produce acute inflammation. The irritating effects of foods are more marked in young chickens than in adult fowls, and generally appear much more readily in fowls that take little exercise than in those that are active and vigorous. When highly irritating or poisonous substances are taken into the system the difference in results is not marked, though a vigorous healthy fowl does seem better able to overcome their effects. The foods and substances specially mentioned as causing inflammation of the crop are: Decomposed meats and putrid foods of any kind, unslaked lime, paint skins, rat poison, excessive use of condiments and spices, milled by-products containing too large proportions of hulls or other indigestible fibrous particles. Salmon notes that it may result from the presence of worms in the crop, and that it occurs as a complication with thrush, diphtheria, and cholera. As has been stated, it also occurs frequently with gastritis.

TREATMENT.—If the cause of inflammation is known, it will help in determining the course of treatment.

“If unslaked lime has been taken, give for drink vinegar water.

“If phosphorus has been taken, given magnesia.

“If lead* (paint) has been eaten, give six drops diluted sulphuric acid in three tablespoonfuls warm water.

“In all these cases try to empty the crop by holding the head downward and working the contents of the crop out through the mouth. If crop is nearly empty give warm water to furnish something to work upon. After the crop is empty give for drink flax-seed tea, and feed lightly for several days.” (“Farm-Poultry Doctor”).

The general treatment recommended by Salmon, (“Diseases of Poultry”), is — after emptying crop: “Give two grains subnitrate of bismuth and one-half grain bicarbonate of soda in a teaspoonful of water. Keep the bird without food for eighteen or twenty hours, then feed sparingly of soft, easily digested food. If one-half grain of quinine is given morning and night for two or three days recovery is hastened.”

Salmon also mentions salicylic acid as prescribed by some authorities to be given after the crop is empty. Dissolve one grain in one ounce of water, and give two or three teaspoonfuls as a dose.

“Mucilaginous or albuminous fluids, such as barley water, milk, isinglass, or a thin solution of gum should be freely administered after the first evacuation of the crop. Should phosphorus have been taken, magnesia should be given, followed by turpentine mixed in cream. Oil being a solvent of phosphorus, must on no account be administered.

“Crude or unslaked lime is an irritant poison to fowls, producing inflammation of the throat, gullet, crop, gizzard, and intestines. Oil should at once be administered, followed by full and frequent doses of mucilaginous or albuminous fluids.” (“Diseases of Poultry.” Hill).

*Such earth paints as venetian red and the various mineral browns are not injurious to fowls. Venetian red is said to have some medicinal value.

Gastritis—Inflammation of the Stomach.

In fowls the stomach proper is a small organ, appearing more like an enlargement of the œsophagus just before it reaches the gizzard, than like a separate organ. Ordinarily it is difficult or impossible to make a distinction by outward symptoms between inflammation of the crop and inflammation of both crop and stomach. In the comparatively rare cases in which there appears to be gastritis or inflammation of the stomach alone, the disease is not likely to be identified with any degree of certainty except as a result of discovery of a cause for it.

SYMPTOMS.—In general the same as for inflammation of the crop, (which see). In simple gastritis, the stomach alone being affected, the distention of the crop might not be especially noticeable, though there were some gas passing through it. Constipation is a frequent symptom in gastritis.

CAUSES.—In general the same as for inflammation of the crop, (which see).

TREATMENT.—“Remove cause if possible to discover it. Give rice water for drink, soft mash made with the water in which clover hay has been cooked. Arsenite of copper, one-fourth grain to each quart of the rice water (drink) will do for medicinal treatment.” (“Farm-Poultry Doctor”).

“If the disease is identified in its early stages, seek for its cause and endeavor to overcome it by removing the cause. Change the ration and give more easily digested food with some meat. Feed regularly, often, and a small quantity at a time. Give some cooked food with barley water or milk for drink, or put twenty grains of bicarbonate of soda to a quart of drinking water. In severe cases give two grains of subnitrate of bismuth three times a day in a teaspoonful of water. Counteract constipation with epsom salts (twenty grains) or castor oil (one teaspoonful) once a day as long as may be necessary.” (“Diseases of Poultry.” Salmon).

“Nourishment in the shape of soft, cooked, and mucilaginous food. Medicinally, a little salad oil, to overcome constipation, also injection of some per rectum. A grain each of opium and calomel occasionally. For drinking purposes, lime water and milk, and barley water.” (“Diseases of Poultry.” Hill).

The reader should note that in two of these treatments great stress is put on the finding and removal of the cause. With fowls at liberty, especially in towns, it is often hard to find the cause, and unless one can find some cause for gastritis and inflammation of the crop at home, or in the house, if the fowls have the run of his own premises, he should confine them where he is sure that they can get nothing but what he wants them to have, and see to it that he gives them nothing that would produce or aggravate the diseased conditions he is trying to correct. From the correspondence and conversations I have had with poultrymen whose fowls had acute trouble, which from their descriptions seemed to be inflammation of either crop or stomach, or both, I find that many attempt to correct the trouble by the medicinal treatment without giving due attention to diet, and without either removing the cause or isolating the fowls from any possible cause.

It should be noted, also, that one treatment suggests a complete change of food. The object of this is to secure the removal of any possible cause of trouble in the food.

Diseases of the Liver.

The annual losses of poultry due to liver trouble in various forms are numerous. These diseases seem to occur chiefly among adult fowls, and to be most prevalent in the latter part of the winter and through the spring. The reasons for their frequency then are easily found. The common forms of liver trouble result from improper feeding and lack of exercise. These causes operate most extensively during the winter, and they usually operate slowly, and the symptoms of liver troubles are generally obscure and not recognized until a post mortem of fowls dying without special outward symptoms shows a diseased condition of the liver. Hence liver trouble may become general and reach advanced stages in a flock before their presence is suspected. Meantime, the conditions which cause them may be continued, the owner of a flock not infrequently supposing that the absence of sickness in it contradicts the teachings of those who advise methods designed to preserve health, while as a matter of fact many of his fowls are in a quite advanced stage of some liver complaint.

The more common forms of liver complaints are not contagious, but as all the fowls in a flock or in a large stock are equally subject to the conditions producing the disease, the keeper, not unnaturally, may at first attribute deaths from liver trouble to some mysterious and rapidly fatal epidemic.

While the developments of liver trouble resulting from improper feeding and lack of exercise are not contagious, even though they may appear as an epidemic, some of these same forms of liver trouble occur also in contagious diseases affecting other organs. Salmon mentions cholera, tuberculosis, aspergillosis, and the black-head of turkeys as the contagious diseases most frequently producing liver troubles as complications. The liver, he says, is particularly subject to the attacks of the parasites which cause these and some other diseases. In what degree an absolutely healthy liver may be less vulnerable to attacks of these parasites, does not appear. Perhaps it could not be demonstrated, but on general principles and from the fact that the measures recommended to prevent these diseases are to a considerable extent the ordinary rules for the preservation of health, I think we may say that while correct feeding and sanitary conditions and good health do not furnish immunity from any contagious disease, they do in general greatly reduce both the numbers affected and the seriousness of the attacks.

Congestion of the Liver.

SYMPTOMS.—There are no special external symptoms. Sanborn mentions as early symptoms: Rough plumage; watery diarrhea, first brownish, then yellow; lack of appetite and indisposition to move. The comb may be purplish at first, becoming dark, and then quite black. Hill says that there is sometimes a slight enlargement and heat at the bottom of the breast bone.

CAUSES.—There have been variously stated by different authorities, no one furnishing a complete list.

Salmon mentions as causes:—Lack of exercise and overfeeding; tainted or moldy food; or poisonous substances; effects of contagious diseases; obstruction of circulation of the blood by disease of the heart and lungs.

Sanborn, after mentioning the overfeeding of fat producing foods and excessive use of spices and stimulants as general causes of

liver troubles, says that congestion of the liver may be caused by any disease of crop, gizzard, or bowels, that obstructs the circulation of the blood. Disease of the egg passage he mentions as frequently accompanied by congestion of the liver. Feeding "egg foods" to hens in close confinement has a tendency to produce this condition, as also have the feeding of too large proportion of corn, or corn meal or potatoes.

Hill says that the disease is especially liable to occur among fowls confined in a hot locality or houses and fed stimulating food.

Vale, who for many years has made a specialty of post mortem examinations for English poultrymen, gives as causes, — a chill, a close unsanitary house, unsuitable food, too free use of condiments, and invasion by disease germs. The last he considers the most common cause of congestion of the liver, a conclusion in which the other authorities do not seem to coincide, and which does not apparently hold good for cases as currently reported to me by correspondents. By far the larger proportion of cases of liver trouble coming to my notice are accounted for by bad feeding conditions.

A post mortem examination of a fowl affected with congestion of the liver shows that organ enlarged, full of blood, tender and easily torn.

TREATMENTS.—In a disease like this in which there are no pronounced external symptoms to positively identify it, treatment must generally be tentative. It would probably be given intelligently only when one or more fowls having died of liver trouble, examination of the bodies showed what was wrong — and when other fowls of the flock showed similar symptoms of indisposition the natural inference would be that the cause was the same, and treatment would be given for congestion of the liver. Also in a case where the general symptoms indicated occurred and some of the causes of liver trouble were known to be present, it would be a good guess that the trouble was with the liver, and treatment for congestion of the liver would be the most promising line of treatment to follow. A number of treatments are recommended :

"A teaspoonful of castor oil, or one-half teaspoonful sulphate of magnesia, dissolved in water, given once a day, combined with a diet of cut clover in winter, or cooping out on grass in summer, will be helpful." (Sanborn).

"Give sulphate of magnesium, or sulphate of sodium in a purgative dose (20 grains to a dram), and follow with sulphate of magnesium 10 grains, bicarbonate of sodium 2 grains, repeated daily for a week." (Salmon).

"Ten grains each of sulphate of magnesia and bicarbonate of soda daily until four or five doses have been given; afterwards a little powdered gentian should be mixed with the food, and a little iñtrohydrochloric acid mixed in the drinking water." (Hill).

GENERAL TREATMENT FOR FLOCKS HAVING NUMEROUS CASES OF CONGESTION OF THE LIVER. — In this country by far the greater part of the liver troubles among fowls seem to have their beginning in warm winter weather. All through our northern states fowls have to be confined to their houses much of the winter. When the snow is deep the only opportunity they have to get out is when the keeper shovels off a little space for them near the house. Even this little is often neglected, and it is quite the common thing for fowls not to get out of their houses for four, five, or even six months at a time. Not only are they closely confined, but the poultryman endeavoring to make the most of his equipment usually overcrowds them. Added to this is another error: The winter ration, adapted to cold winter weather, is too often given just the same through all kinds of changes, when there are many periods of from a day or two to as many weeks, when the ration should be less heating and stimulating.

If due attention is given to adapting the diet to the temperature, there need be little trouble from the other unfavorable conditions; but if all three unfavorable conditions operate at the same time a few cases of liver trouble will be likely to appear at any time, and are almost certain to develop toward the end of the winter. Just as soon as it is suspected that there is liver trouble in the flock one or more indisposed birds should be killed and examined. If examination confirms the suspicion prompt measures should be taken to counteract bad tendencies. These should look first to good diet. Make the mash, if mash is used, light and bulky; feed green and vegetable foods liberally; compel exercise in scratching for food. Then get the fowls out a little every day, and if sanitary conditions in the house are at all objectionable correct them.

When the conditions to which a flock has been subjected are such that a number of bad cases of liver trouble develop, it cannot be expected that corrective measures will arrest development and restore to health in every case. On the contrary, a few cases may develop in spite of remedial measures, and the fowls exposed to the disease are likely to give a much larger proportion of cases of sickness of various kinds afterwards than fowls that as a flock had always been healthy. This being the case, it is generally good policy to dispose of a flock that has been through such an experience as this as soon as it can be done to advantage, and replace with always healthy stock.

Inflammation of the Liver.

Inflammation of the liver is an advanced stage of congestion of the liver.

SYMPTOMS.—There are none that are regularly associated with this disease and peculiar to it. Vale says it is impossible for the most scientific observer to diagnose either inflammation or congestion of the liver with positive certainty. The symptoms are much the same, and outwardly are the common general symptoms of disease. Hill says there is sometimes enlargement of the abdomen and tenderness on external pressure, sometimes a jaundiced or yellow hue of the skin, and, not infrequently, lameness in the right leg.

CAUSES.—Same as in congestion of the liver.

TREATMENT.—Rarely successful. The disease is sometimes rapidly fatal, again assumes a chronic form, and the fowl quickly wastes away. Only in case of a valuable specimen is it worth while to attempt treatment. Even in such cases, if the fowl does not promptly respond to treatment, it is as well to discontinue it and put the bird out of misery.

Some of the medical treatments recommended are :—

“Half a grain each of calomel and opium, repeated in six hours, and followed by ten grain doses of tartrate of potash morning and night.” Hill.

“About twenty grains of sal ammoniac in a wineglassful of rather warm water twice a day.” Vale.

“Begin with one-half to one grain calomel, followed with twenty

grains of epsom salts and two grains bicarbonate of soda after twelve hours. Naphthol or benzonaphthol may be given twice a day in one grain doses to disinfect the intestinal canal." Salmon.

"A teaspoonful of sulphate of magnesia dissolved in water at night, and the next morning one-half teaspoonful of castor oil. Tincture nux vomica, one-fourth teaspoonful to a pint of water, to be kept constantly within reach for drink." Sanborn.

Diet as recommended under "General Treatment," on page 72.

HOW TO DISTINGUISH PRACTICALLY BETWEEN LIVER TROUBLES.

The practical question which comes up in the mind of the reader in connection with these two diseases and becomes more insistent as he learns of the other liver troubles which are, like them, obscure in their symptoms, and not to be identified with certainty during the life of the fowl is:—How am I to know when to apply one treatment, and when another advised as more appropriate to another form of disease?

The answer to the question is that medical treatment for such diseases must be mostly by guess. As between the two forms of disease already considered, the poultry keeper would have to be guided, if he concluded to give medicines in the treatment of those he attempted to doctor, by what he discovered in examination of such birds as died or might be killed for examination, and somewhat by the length of the sickness of a fowl. It does not appear from any of the authorities at hand that a post mortem of a fowl having inflammation of the liver shows symptoms plainly different from those described for congestion. There is no mention of an appearance of the organ peculiar to this stage of the disease. Apparently the only way to differentiate between them is, when liver diseases develop in a flock, and that fact has been established, to treat fowls which show signs of ailing for congestion first, and then if no improvement is made and the disease seems to pass into a chronic form, to treat for inflammation. This suggestion is for those who insist on treatment; the more practical way is to give the whole flock the general treatment recommended on page 72, and kill all ailing fowls that do not soon improve with such treatment.

The following developments of liver trouble are recognizable only after post mortem examination, and can be given specific treatment

only on the assumption that if fowls that die or are killed uniformly show the same condition other fowls becoming sick should be given the treatment appropriate to that form of liver trouble.

Enlargement or Hypertrophy of the Liver.

This is a condition of overdevelopment or abnormal growth of the liver. It is very common in old fowls, and may develop in any fowls well fed and given little opportunity to exercise. It does not appear to be essentially different from the condition of the liver produced when, principally in some foreign countries, fowls are fed to produce excessive development of the liver, the liver so enlarged being esteemed a great delicacy. Naturally those who grow these livers contend that there is quite a difference in the condition of the liver artificially enlarged by design, and that which has attained unnatural proportions without any intent on the part of anyone to produce such condition. However that may be, the enlarged liver considered as an organ with functions to perform in the assimilation of food is an abnormal organ, not in condition to perform its functions normally, and so diseased, according to the definition of disease mentioned at the beginning of Chapter II.; and further usefulness of the fowl depends on a restoration of normal conditions.

SYMPTOMS.—There are no special external symptoms. Sanborn says fowls in this condition sit on the ground most of the time, and refuse to go to roost—symptoms, however, which occur very often in other cases.

TREATMENT.—General correction of habits, with diet as in other liver troubles. Sanborn suggests giving as drink a half teaspoonful powdered muriate of ammonia to each quart of water.

Atrophy or Wasting of the Liver.

This disease, and that next described, are somewhat alike in symptoms. Ordinarily no practical purpose would be served by making the distinction between them. They may be regarded by the poultryman as different developments from the same general causes, which he cannot identify during the life of the fowl, and which it is to his advantage to identify after death, only as they

may furnish evidence of long continued mismanagement, and lead him to adopt better methods of feeding and caring for his fowls.

SYMPTOMS.—There are no special external symptoms. An examination of the fowl after death shows the liver shrunken and somewhat granular, and sometimes of a yellowish cast. With the decay of the liver tissue Salmon tells us there is sometimes a partial development of new tissue, but not to a degree that restores the organ to its functions.

CAUSES.—In the statement of causes we find some authorities differ, though as all treatments of the topic are very brief, such differences are readily accounted for without assuming these authorities to be at variance. Each probably mentions the cause which most impressed him. Salmon thinks it a common development from chronic inflammation of the liver, but mentions as causes given by others, compression, due to an excess of abdominal fat, and infection. Sanborn and Hill give most prominence to lack of nutrition, both stating that they have observed the disease in fowls that were given an insufficient supply of food, or a ration lacking in some requisite.

TREATMENT.—The general treatment for liver troubles. Sanborn advises with this the generous feeding of green cut bone and “Fowler’s solution of arsenic,” a teaspoonful in each quart of drinking water, the water to be fresh daily. Salmon suggests the same treatment as for inflammation of the liver.

Fatty Degeneration of the Liver.

Salmon, alone, of the authorities I have used makes special mention of this disease. From my own correspondence I judge it to be quite as common as the foregoing. Inquiries frequently describe the symptoms of it so plainly that there is no mistaking it.

SYMPTOMS.—No special external symptoms. A post mortem shows the liver shrunken, hard, with yellowish or grayish streaks or spots. Salmon says a microscopic examination often shows the liver tissue partially destroyed and replaced by fat. The condition of the liver in this disease is sometimes so like the condition in tuberculosis as to render positive identification difficult.

CAUSES.—The general causes of liver troubles.

TREATMENT.—The general treatment given on page 72.

Jaundice, Biliary Repletion.

This is another disease discussed only by Salmon, who quotes from Megnin concerning it. A number of cases have been described to me where it appeared in connection with other forms of liver trouble.

SYMPTOMS.—None externally, except that sometimes the comb and wattles are yellowish,—a symptom which may occur in other forms of liver trouble. A post mortem examination shows the bile so abundant that it abnormally distends the gall sac, and may penetrate the adjoining organs, discoloring them for some distance, and causing poisoning and death.

CAUSES.—Chronic, mild congestion of the liver, or continuous feeding of rations containing too great an excess of starch or fat.

TREATMENT.—Change to a diet, including a great variety. Megnin recommends a purgative dose of aloes, 1-2 to 1 grain.

Diseases of the Intestines.

While improper foods and feeding are the most common causes of intestinal disorders, there are other causes which may produce various kinds of intestinal troubles either in the same forms or in forms so like as not to be clearly differentiated by the lay poultry doctor. In this chapter we will take up only the developments of intestinal derangement in which improper foods and feeding are the sole or principal causes, leaving the contagious intestinal diseases to be treated in the chapters devoted to contagious diseases, and internal parasites.

In discussing this class of diseases it is sometimes a puzzle to make a comparison of the views of different authorities, for there is probably no other class of diseases in regard to which there are such differences of opinion leading to divisions of the subject which make accurate comparisons impossible. The divisions of the subject which I have made are doubtless open to criticism from a professional standpoint, and may be in some respects inconsistent, but my experience in advising treatment for different forms of diarrhea indicates such a division of the subject as I have made as the one which is most likely to help poultrymen to apply in each case the line of treatment best adapted to it.

Diarrhea, Simple Diarrhea.

This is a very common trouble. In many fowls it is constitutional and chronic, and continues in mild form all through the life of the fowl, never perhaps dangerous, but nearly always in some degree detrimental. Few fowls do not have more or less diarrhea. Many cases recover quickly, and without treatment. At the same time diarrhea is a symptom in many dangerous diseases, and for this reason, and because the general debility and local susceptibility which result from a chronic diarrhea make fowls less able to resist disease, right conditions of the bowels should be maintained.

SYMPTOMS.—A mild diarrhea shows no symptoms that attract notice but the condition of the excrement. Normally the droppings of fowls are rather dry, retain the shape in which they are voided, and may readily be removed, leaving the spot on which they had fallen either slightly stained, or not at all. From droppings boards on which land plaster, dry earth, sifted coal ashes, or other absorbent of the kind has been sprinkled, the droppings, if of the normal consistency and character, may readily be brushed or scraped, leaving no trace whatever, and only very slightly soiling broom, hoe, or shovel.

Without marked departure from the normal droppings may be wet — watery — with a tendency to flatten on the surface on which they rest. On boards they moisten the surface for some distance around them. On an earth floor or a surface well covered with dust or other absorbent, the moisture from them will cause a considerable amount of the absorbent to adhere to the droppings, the excess of water in them is readily taken up by any absorbent present. This condition of the droppings is constitutional with some fowls, and characteristic of some methods of feeding. It is perhaps most appropriately described as “looseness.” It is not diarrhea, though fowls having it are probably more susceptible to intestinal diseases than others. It may continue for a long time, and even throughout the life of the fowl apparently without being detrimental to its health or productiveness. When such stock is used for breeding, however, an unusual amount of bowel trouble is likely to occur in chicks produced from it. Mere looseness of the bowels is not accompanied by any offensive odor.

When the excrement becomes soft and pasty or liquid in consistency and whitish, yellowish, greenish or brownish in color, and has a more or less marked offensive odor, the condition is properly described as diarrhea. The evacuations in diarrhea are often of such consistency that the water in them is not readily taken up by absorbents with which they come in contact, and they are decidedly nasty, not only adhering to utensils used in removing them, and making ordinary cleaning difficult, but soiling the feathers of the fowls and sticking to roosts, nests, and feed troughs.

CAUSES.—Diarrhea may come from any cause that affects the digestive organs. As may be noted in reading over this book, diarrhea occurs as a symptom in a very large proportion of the diseases of poultry. The immediate cause of diarrhea occurring independently is generally improper feeding. Sometimes the effects are almost instantaneous, and continue hardly longer than the time required for the disturbing substance to pass through the system. Again the diarrhea develops slowly, and though it may be corrected without medical treatment, by simply correcting the diet it requires some time after correct conditions are established before the diarrhea completely disappears.

Unfavorable temperature conditions developing colds which seem to affect the bowels rather than the head, throat, and lungs — the parts most susceptible to such conditions — cause diarrhea much oftener than is generally supposed. In such cases the excrement is apt to show a preponderance of watery or frothy mucus which adheres to the feathers about the vent, and is intensely irritating to the skin. Diarrhea from bad temperature conditions may occur though the food and method of using it are beyond criticism, but in the greater number of instances it seems to be a case of a cold settling in the weakest organs, and the development of diarrhea merely hastened as a result of it, or diarrhea produced by a combination of causes, when the operation of a single cause had not created any disturbance.

Young chickens are much more susceptible to diarrhea than adult fowls. This is especially noted in the effects of wrong temperatures on brooder chicks,—the temperature conditions being so difficult to control. Young chickens are almost invariably more easily affected by improper feeding than are adult fowls. This is in part because

the organs are more delicate and sensitive, and in part because they are so much smaller, and therefore more seriously irritated by the foreign substances often given with the food.

TREATMENT.—Cases of simple diarrhea, due to improper feeding and chronic looseness of the bowels, are most satisfactorily treated by correcting the diet. Ordinarily no other treatment will be necessary. The error in feeding must be found and eliminated in the one class of cases. In the other, a system of feeding adapted to the peculiar constitutional characteristics of the fowls must be followed — usually “dry feeding,” that is, giving all grain food, including mill stuffs, dry. With some fowls it is only necessary to continue the dry feeding until the looseness has disappeared entirely, when they may gradually be put back on the ordinary diet, and the looseness will not reappear. In other cases looseness can only be avoided by constant dry feeding.

When fowls having a chronic looseness of the bowels are used for breeding, they should be “dry fed” for some months prior to the breeding season, and all through it. By this means care being taken to avoid other causes of bowel trouble in the chicks, the tendency is much reduced in a single season, and I have known cases where it seemed to have been overcome within a year.

When catarrhal discharges indicate colds, treatment seldom needs to go beyond keeping the fowls dry, warm, and comfortable, and giving suitable food. Nearly all cases of simple diarrhea yield readily to simple treatments if given before the trouble has been allowed to develop into something worse. If for any reason a sick fowl seems slow to respond to dietary and hygienic treatment try one of the following treatments:—

“A teaspoonful of sweet oil every four hours, and feed with crust of bread scalded with boiling milk.” Vale.

“One teaspoonful castor oil, followed in an hour with five grains Dover’s powder.” Sanborn.

“A teaspoonful of castor oil, followed by 5 grains of rhubarb, 10 grains of carbonate of soda, or a grain of opium.” Hill.

“Chlorodyne, 3 to 6 drops in a dessert spoonful of water or port wine.” Hill.

“For severe cases, a pill containing 1 grain each tannic acid and opium.” Hill.

Severe Diarrhea — Enteritis — Dysentery.

The lack of harmony among authorities on poultry diseases as to the distinctions to be made between diarrhea, severe diarrhea, enteritis, and dysentery, becomes apparent on the most casual comparison of the different discussions of bowel complaints. But the more one seeks to find the truth in a reconciliation of their differences, the more likely is he to come to the conclusion that their disagreements can make little practical difference to the poultryman treating diseases or studying conditions of disease in his flocks. The differences which might be confusing cease to be seriously troublesome as soon as we come to an appreciation of two facts :— (1) that in the main the authorities differ on names and classifications rather than on essential facts; (2) that in most cases it is practically impossible to distinguish during the life of the fowl between some of the different forms of acute bowel trouble.

We may consider these acute forms of bowel trouble as resulting from a variety of causes which may be roughly grouped in three classes :—

- 1.—Inflammation of the bowels developing from simple diarrhea.
- 2.—Inflammation of the bowels resulting from poisonous or mechanically irritant substances.
- 3.—Inflammation of the bowels due to the presence of parasitic germs and spores.

Whatever the cause of the disease, the general symptoms are much the same. Perhaps the only features that afford any indication of the probable cause of a particular case of inflammation of the intestines are the rapidity of development of the disease and the color of the diarrheal discharges — and these are very unreliable guides. The practical method of proceeding in cases of serious bowel trouble is to apply the general treatment needed to allay the inflammation of the intestines and keep up the strength of the fowl, and at the same time seek to discover the cause. Having found the cause, special treatment appropriate to the case may be given if necessary, but in any event, steps should be taken to make it inoperative. To find the cause of an outbreak of dysentery or enteritis, is one of the most puzzling things in the treatment of poultry diseases.

Before describing symptoms and treating more particularly of causes I will try to give briefly a statement of the ideas of authorities on bowel complaints, which I hope may help readers to avoid the confusion of mind concerning them which has been an unfortunate result of the disagreements of the doctors, and of carelessness in the use of names.

The term, "enteritis," has for some years been growing in common usage. A decade ago it was quite unfamiliar in this country. (Speaking only of its use among poultrymen). A severe diarrhea accompanied by bloody discharges was more likely to be called dysentery, or bloody dysentery, or bloody flux. A severe diarrhea with greenish discharges was commonly called cholera.

Under some circumstances it would probably be impossible for anyone but a specialist to positively distinguish between cholera and some forms of enteritis. But the ordinary poultryman is usually safe in assuming that symptoms which might indicate cholera are not cholera unless developed in connection with the temperature and climatic conditions favorable to the specific germ which causes cholera. These are extreme heat, and a considerable degree of humidity. In any of the more temperate and cooler sections of the country cases of genuine chicken cholera are almost unknown. In warmer sections they occur probably with some frequency, but still are not nearly so prevalent as is commonly supposed. In the northern and western parts of this country one may feel quite safe in diagnosing a disease as enteritis rather than cholera, unless it occurs during or following a period of very hot and quite damp weather. Under such circumstances there would be some uncertainty, but still with the chances against the disease being cholera. Hence in the great majority of cases in which aggravated diarrhea occurs as a symptom it is safe to assume that the trouble is not cholera, which is due to a specific germ, but enteritis, which may be caused by any one or by a combination of several of many causes, and which, generally considered, is a far less deadly and dangerous disease. It is important for the poultry keeper who suspects he has cholera to understand what is the probability of his surmise being correct, because the general attitude toward cholera is one of helplessness, while with enteritis one may reasonably assume that he has a better chance to check the malady,

and at any rate should appreciate that it is due to a cause which must be found and properly treated in connection with the treatment of the disease.

The dictionary definitions, presumed to have been furnished by authorities on the use of medical terms, make a distinction between dysentery and enteritis. Dysentery they indicate as properly applicable to inflammation of the large intestine; enteritis to inflammation of the small intestine. Even the definitions which indicate such a distinction do not observe it. Dysentery as a poultry disease is mentioned by only one of my authorities on poultry diseases, and described only in an incidental and unsatisfactory way. Another considers enteritis not as a disease but as a symptom of a disease, which is too fine a distinction for laymen, and apparently, also, for some other medical men.

Salmon presents the most consistent arrangement and differentiation of enteric, or intestinal troubles. The name enteritis means literally inflammation of the intestine. Every case of inflammation of the intestines he considers as some form of enteritis. Gastritis, or inflammation of the stomach, and enteritis, or inflammation of the intestine, frequently occur in conjunction. Perhaps neither condition could become chronic without inducing the other. As it is practically impossible to say from the symptoms of a living bird whether inflammation is limited to one part of the digestive tract, or extends to others, this authority describes simple diarrhea as (in its simplest form or early stage) gastro-intestinal catarrh, and (in more advanced stage) gastro-enteritis. These terms would probably cover all cases of diarrhea due to ordinary causes — that is, to errors in feeding, to poor quality of food, and to temperature. He notes as the distinguishing feature of post mortem examination of such cases that in cases that are merely catarrhal only superficial changes are found in the parts affected, while in gastritis and enteritis the inflammation goes deeper, reddening and thickening the parts. Acute enteritis, due to poisoning, he calls toxic-gastro-enteritis. Enteritis due to bacteria, of which several are described, he calls bacterial enteritis. Enteritis caused by protozoa (of which two species are noted as producing the disease in poultry), he calls psoro-spermic enteritis.

With this explanation of terms and their use the reader may go

back to the simple statements : that enteritis is inflammation of the intestines ; that it is commonly associated with a like condition of other parts of the digestive tract ; that there are numerous causes for it ; that the general symptoms are the same for all forms of the disease ; that the general treatment suitable for one form will be measurably suitable for any form, and may therefore be begun at once as soon as the general character of the disease is discovered ; that the different forms of the disease require appropriate special medical or sanitary treatment ; and that therefore it is essential that the cause and precise nature of the trouble be ascertained if the disease is to be eradicated.

Symptoms of Enteritis.

The first symptoms of enteritis are the general symptoms of weakness and dullness which are seen in most severe diseases. Accompanying these we often see the reluctance to move, and evident painfulness of movement caused by the pain due to the inflamed condition of the abdomen. The inflammation may be so great that the high temperature of the bowels is noticeable to the touch of the hand placed upon the abdomen of the fowl. There is usually severe diarrhea ; sometimes diarrhea and constipation alternating. The evacuations may show any or all of the color conditions commonly observed in cases of severe diarrhea, watery, mixed watery and solid, whitish, greenish, bluish green, brown, red, bloody. Particular colors or conditions may represent the degree to which different organs are affected, or indicate to an experienced eye the progress of the disease, but to the layman they have no special significance.

Causes of Enteritis.

These have already been mentioned as comprising three general classes. Of the first class,—developments from simple diarrhea it is not necessary to say more than has been said under causes of simple diarrhea, and the references to causes made under the head we are now considering.

Poisoning,—toxic-ingastro-enteritis,—occurs oftenest in flocks of fowls having their liberty in towns, but is likely to occur in any flock having access to places where articles poisonous to them are left. In addition to the list of substances mentioned as causing catarrh of the crop (p. 66) other common substances of a poison-

ous or acutely irritating character are salt, concentrated lye, nitrate of soda, (used as fertilizer) arsenic, (in Paris green) copper, (in spraying solutions) and ergot of rye are mentioned. Hill also cites the use of severe purgatives as a common cause of irritation of the intestines.

Bacterial enteritis is propagated by contagion and develops most freely under filthy conditions, and (of course) in hot, wet weather when all the evils of filth are most apparent. Psorospermic enteritis Salmon regards as very different from bacterial, both in character and symptoms, but I think it doubtful whether a layman could observe the differences and differentiate the treatments intelligently. The only marked difference in the symptoms described is in the color of the excrement, and this — though perhaps useful to a professional — seems a most uncertain and unreliable guide to ordinary people. Besides these differences are possibly individual differences, or due to complications, for I have had correspondents describing the symptoms of different fowls sick at the same time, and apparently from the same cause, give descriptions of diarrheal conditions which in one corresponded closely with Salmon's description for bacterial, and in another with his description for psorospermic enteritis. These *psorosperms* are minute parasites, supposed to be taken into the system with the food and drink. They produce white patches or points in the walls of the intestines which resemble tuberculous growths, and may be mistaken for them. These parasites infest the ground on which affected fowls run.

Treatments for Enteritic Inflammation.

Under this head I give the several treatments recommended by different authorities, indicating with each the term applied to the form of the disease for which it is especially recommended. My object in doing this is twofold: First a variety of remedies generally applicable to troubles of this kind is given, and in emergencies the available one, though not perhaps the best, may be used pending a more exact diagnosis of the trouble, or the procuring of the remedy judged most appropriate. Second, by indicating the precise term applied by each authority quoted to the form for which his remedy is given. I hope to avoid possible misrepresentations which might occur were I to undertake to harmonize the use of terms.

FOR SEVERE DIARRHEA. (Salmon).

A tablespoonful of olive oil, followed with 1-8 grain powdered opium and 2 grains subnitrate of bismuth every four hours. If diarrhea continues after subject seems to be recovering, check with laudanum, 5 to 10 drops, or give 10 drops of a mixture of equal parts laudanum and tincture of catechu; or in mild cases add one or two drams of sulphate of iron to the pint of drinking water.

FOR DYSENTERY. (Sanborn).

"Ten grains sulphate of magnesia, followed in three hours by five grains of Dover's powder. If dysentery continues, two grains of Dover's powder may be given night and morning, but treatment in these cases is not often successful."

FOR ENTERITIS. (Hill).

Give salad oil to remove irritating matter. Follow this with mucilaginous liquids, such as tepid barley water, arrowroot, milk, and isinglass. Keep the bird on an ample and very soft bed. When convalescing give chlorate of potash in the drinking water, or administer a five grain dose. Feed boiled barley and rice with warm milk and bread for at least a fortnight.

FOR ENTERITIS. (Salmon).

"To soothe the bowel give a little sweet oil every three hours, and feed sparingly with raw egg and crust of bread scalded with boiling milk. In cases where the patient is frequently straining, increase the dose of oil, and add to it two or three drops of chlorodyne."—Vale.

FOR BACTERIAL ENTERITIS. (Salmon).

Scrupulous cleanliness should be observed about houses and yards. Give only clean water and sound sweet food. Disinfect by saturating floor and woodwork of buildings with five per cent solution of carbolic acid, followed by whitewash. Scald drinking vessels and feed troughs with boiling water. Continue cleaning and disinfection at intervals as long as disease exists. For medical treatment use one of the following:—

Subnitrate of bismuth, 3 grains; powdered cinnamon or cloves, 1 grain; powdered willow charcoal, 3 grains. Give twice a day mixed with food or made into pills with flour and water.

Subnitrate of bismuth, 3 grains; bicarbonate of soda, 1 grain;

powdered cinchona bark, 2 grains; mix and give three times a day in a paste made with rice flour. When diarrhea is arrested, bismuth and soda are no longer needed. Give as a tonic: Powdered fennel, anis, coriander, and cinchona—each 30 grains; powdered gentian and ginger each one dram; powdered sulphate of iron, 15 grains. Mix and give in the feed so that each fowl will get 2 to 14 grains twice a day.

FOR PSOROSPERMIC ENTERITIS. (Salmon).

Clean up and disinfect as for bacterial enteritis. Hyposulphite of soda, 5 grains; quinine (sulphate) 1 grain; subnitrate of bismuth, 2 grains; give two or three times a day to adult fowls, in less proportion to young chicks; or, a mixture of equal parts powdered fennel, anis, coriander, gentian, ginger, and aloes may be given in doses of about five grains for adults mixed with soft food.

If disinfection and changes of ground are not successful, dispose of all fowls, plough up the ground, and after a time start with new stock.

CHAPTER VIII.

Some Peculiarly Subtle and Dangerous Diseases.

IN THIS chapter I have grouped together several of the most serious diseases, difficult of identification by outward symptoms, which do not seem to me to be appropriately included in any other chapter. They are mostly contagious germ diseases of infrequent occurrence in comparison with some of those we have been considering, hard to identify with certainty, and likely to quite wipe out flocks in which they obtain a footing. In infectious origin and malignant character diphtheritic roup might well be included in the group, and the contagious forms of enteritis present, in a considerable degree, the characteristic features of the diseases here considered, but those two were so closely associated with other diseases that I think the general reader will get a better appreciation of their nature, and the best methods of dealing with them, by studying them in the connections in which they have been presented.

Diphtheritic roup presents plainly—sometimes with offensive prominence—symptoms the poultry keeper may positively identify by his senses of sight and smell. In enteritis the difficulty is not so much in identifying the disease as in finding the cause of the particular outbreak of it under consideration. But most of the diseases considered here develop obscurely, and originate in causes not so readily avoided by observance of common precautions in diet, sanitation, and general management, and being comparatively rare, and propagating with more independence than the common

diseases, there is not the same ever present necessity of guarding against them, nor the same grounds for assurance of safety from them through the use of ordinary preventive measures. So it has seemed to me that the independent nature of these diseases warranted separate treatment of them, and that this would give a desirable emphasis to the discussion of their causes, character, and treatment.

Tuberculosis.

This disease is so alarmingly prevalent among human beings and in domestic animals that its general character and effects are well understood. It is a germ disease produced by a peculiar bacillus, communicated by contagion, fastening most readily upon constitutionally weak or debilitated stock, and, in adult fowls, seems especially apt to develop from persistent colds which do not run into some of the more readily distinguished developments of colds.

Fowls in general good health and condition may be constantly exposed to contagion without becoming affected, but where the contagion exists there is always the danger of its gaining a foothold in the system of any fowl that is slightly indisposed, while by the gradual increase of the proportion of the flock affected at last a point is reached where chances of contagion are so abundant that it is almost impossible for any fowl long to escape infection. As in human beings, the progress of the disease may be rapid or slow. In the latter case it is less likely to be detected, for affected fowls may continue in fair flesh, quite active and productive, and the disease may make great headway in a flock without its presence being suspected, until, perhaps, a season comes when it is almost impossible to raise chicks from the stock, and investigation reveals the cause of the trouble.

The tuberculosis of birds is said to be not readily communicable to mammals; nor are fowls readily affected by contagion from mammalian tuberculosis. Salmon regards the disease in birds and mammals as two varieties of the same malady, not distinct in form, but the germs peculiar to each so differentiated by having grown so long under different conditions that neither will readily develop outside of its special class of victims. As infection of birds from tuberculosis mammals, and vice versa, though infrequent, is not

impossible, the same precautions should be taken against contagion from one as from the other. While tuberculosis oftenest develops in the internal organs, and no special external symptoms may occur until the affected fowl is in the last stages of the disease, it may affect the bones and joints, producing swelling and stiffness of the joints, (likely to be considered rheumatism), or may form tumors or ulcers. These latter forms, however, seem to be comparatively rare in poultry.

SYMPTOMS. — A contagious disease generally presenting no special outward symptoms, and when developing externally presenting symptoms resembling those of more common, non-contagious troubles, requires expert diagnosis to make its identification positive. The circumstances which warrant suspicions of tuberculosis in the flock are thus stated by Woods :

“ When brooder chicks seem sleepy, droopy, pick up their food and drop it indifferently without swallowing it, have a diarrhea that does not yield to treatment, cough, and ‘pip,’ and have swollen joints, lameness, and pale wasted combs, suspect tuberculosis. If the chicks have fits from no apparent cause, if they eat, but do not seem to grow, if they become deformed, with bulging joints, ‘roach’ or humped backs, or are stunted, thin, and wasted, suspect tuberculosis. These symptoms will not be likely to all appear in one chick, but when the flock presents specimens with many of these symptoms present, it is time to hold post mortem examinations to discover, if possible, what is wrong.

“ With adult fowls the disease may show itself in many ways, or may be present unsuspected. On general principles, suspect cases of coughs and colds which do not yield to treatment, and diarrheas which are not checked by the ordinary methods of treatment. Tubercular fowls, when well advanced, usually have a persistent diarrhea, pale combs, listless sleepy expression, and lose weight. There may be lameness, swollen joints, and bone deformities. Sometimes the swellings break down and ulcerate. Suspect all ulcers and tumors containing ‘cheesy’ matter.

“ In post mortem examination, if you find any of the organs of the body more or less filled with grayish or whitish tubercles (points or nodules) varying in size from a pin-point to that of a

small bean, or find tumors with soft cheesy centers, you can be sure that the trouble is tuberculosis.

“In young chicks the tubercles will be more commonly found in the lungs. In adult fowls the disease is more apt to be general, and the liver and abdominal organs show a large percentage of tubercles. The intestines may be covered with fine gray or whitish points, or may have thickened, ulcerated walls, and partial strictures of the gut. The thin membrane covering the intestines may be covered with tubercles, or show only a few, and may be thickened and adhere to the walls of the abdominal cavity or to the intestines by tough membranous attachments. Make a careful search for tubercles when you find a large soft liver, abnormally distended gall sack, and discolored, congested lungs in old or young specimens.”

While the above statement covers the points which may be discovered by the eye, I think that the statement as to the certainty of identification by tubercles and tumors should be qualified, and that here as at other points it would be better to say “suspect tuberculosis.” For while a medical man might not easily fall into the same error, others have frequently mistaken other nodules, patches or ulcers for tuberculosis. Salmon declares that the only positive diagnosis is that which identifies the bacillus, and this I judge from results in cases when I have referred correspondents who thought they had tuberculosis in their flocks to the veterinary departments of various state agricultural colleges, is so likely to be the case, that I would advise consulting an expert in every case where there were grounds for suspicion of tuberculosis.

CAUSE.—Tuberculosis has a single cause — the *bacillus tuberculosis*. The cause operates through contagion which may be carried and transmitted in many ways, but chiefly by contact with tuberculous fowls or their discharges.

TREATMENT.—Treatment for tuberculosis in fowls after it has advanced to such a stage in an individual as to be suspected, or in flocks in which it appears to be established, is not profitable. The best thing to do with the individual is to kill it; with the flock to clean it out, thoroughly cleanse and disinfect the premises, and begin over with new, healthy stock. A fowl known to be tuberculous should not be used for food or bestowed where animals

might eat the carcass. The body should be burned or deeply buried. In cleaning out a flock in which there is much tuberculosis, there may be specimens fit for food, and it is not always a simple matter to decide what disposition to make of such, and how to judge them. It is probably safe to use for food all birds in good flesh and condition, with plump, healthy skin, and showing none of the external symptoms of the disease. The fact that a fowl was in poor condition would not necessarily indicate tuberculosis, though under the circumstances it would not be advisable to market such a fowl without further assurance of freedom from disease. Such assurance could be obtained only by drawing the carcass and inspecting the internal organs, a proceeding which is not practicable where poultry is sold undrawn. Hence, it will in most such cases be better to sell only those which show good quality and condition. This point as a little aside, but the question inevitably comes up to the poultryman considering the method of dealing with a flock containing many tuberculous fowls.

The preventive treatment of tuberculosis consists in making and keeping houses and appliances accessible to fresh air and sunlight. (Sunlight and air are generally destructive to disease germs, and in avoiding contagion). The first part of the treatment is easy, the last more difficult, for the germs of the disease may unwittingly be introduced with new fowls, or with fowls returning from shows, or in various other ways. However, by sanitary precautions and by severe culling of stock lacking in vigor, the flock may be kept at a high point of power of resistance, and this perhaps is the most important thing of all.

Cholera.

Cholera, as stated in discussing some of the diseases commonly mistaken for cholera, is in the greater part of this country of rare occurrence. Previous to the publication of Salmon's "Diseases of Poultry," American writers on poultry diseases generally followed the European, especially the English authorities. Salmon based his description of the disease on symptoms exhibited by fowls in which he had produced the disease by inoculation. These symptoms he found in every case different in some important particulars from the symptoms observed in Europe. Woods, writing in *Farm-Poultry*, in 1902, gave his observations on an epidemic of cholera

which occurred in a flock in his charge the previous year. His observations coincide generally with those of Salmon, especially as to the points of difference in symptoms in Europe and America. At about the same time Drs. Curtice and Smith were investigating a very serious epidemic of supposed cholera in Rhode Island. This disease they discussed in a bulletin* as "Fowl Typhoid, A Disease Sometimes Mistaken for Cholera." From that description of the disease I infer that, if their diagnosis was correct, the disagreement between European and American observations might be explained on the supposition that in Europe typhoid had generally been mistaken for cholera.

But here, as in so many cases we have had to consider, the differences of authorities can make little practical difference to poultrymen. Only the bacteriologist by laboratory tests can positively distinguish between these diseases. Outside of the laboratory they present much the same symptoms, and require similar preventive treatments.

SYMPTOMS.—"The earliest indication of the disease," says Salmon, "is a yellow coloration of the urates, or that part of the excrement which is excreted by the kidneys. This in health is a pure white, though it is frequently tinted with yellow as a result of other disorders than cholera. While therefore this yellowish coloration of the urates is not an absolutely certain proof of cholera, it is a valuable indication when the disease has appeared in a flock and an effort is being made to check its course by isolating birds as soon as affected. In a few cases the first symptom is a diarrhea in which the excrement is passed in large quantities, and consists almost entirely of white urates mixed with colorless mucus. Generally the diarrhea is a prominent symptom. The excrement is voided frequently, and consists largely of urates suspended in a thin, transparent, sometimes frothy mucus. The urates have a deep yellow color, which in the later stages of the disease may change to greenish or even a deep green."

Woods observes that the diarrhea has a characteristic fetid odor, which lik the "roup smell," once identified, is ever afterwards recognized instantly.

*Bulletin 87 of the Rhode Island Agricultural Experiment Station.

The course of the disease may be rapid or slow in its progress through the flock. It may take all within a few days, or the fowls may drop off by twos and threes through a period of several weeks. After the first symptoms appear the development in individual cases is usually rapid. Forty cases investigated by Salmon averaged three days, but many birds die within a few hours after the diarrhea sets in. The time required to develop the disease after exposure or inoculation is given by Salmon as four to twenty days, and by Woods as three days to two weeks, each giving the result of his own observations. After the diarrhea sets in fever develops, and there is drowsiness, weakness, emaciation and exhaustion—the common general symptoms of virulent or fatal disease. Both Salmon and Woods describe the color of the comb as pale. The European writers describe it as dark. Curtice and Smith describe the comb in fowl typhoid as in some cases pale, in others dark. Affected fowls frequently die in convulsions.

Post mortem examinations show general inflammation and congestion of the organs, the liver greatly enlarged and softened, and sometimes greenish colored; gall abundant, thick and dark; the kidneys congested, with accumulations of the yellow urates seen in the evacuations; the gizzard and intestines contain green fluid. The heart and lungs may be affected, though the principal seat of the disease is in the digestive organs.

CAUSE.—Cholera is caused by a very minute germ, transmitted by contagion. The germ is said to be breathed into the body, or taken in with the food, or transmitted by copulation, or through wounds in the skin of the fowl. Once admitted to the body the germs multiply in the blood and other liquids of the body, thus affecting every organ and function. Salmon says that in acute cases death results from poisoning by the substances produced by the germs, and in chronic cases by the interference with the functions of digestion, assimilation, and nutrition. The germ is said to grow best at 85 to 105 degrees Fahrenheit. It has itself no power of movement, and depends for transmission upon men, animals, fowls, and wild birds. It is said that with such transmission prevented a separation of ten feet will insure immunity from contagion. Perhaps the most common method of distributing the contagion is on the feet of persons or animals coming from infected

premises. The germs in the droppings of the fowls adhere to the shoes or feet, and so may be carried long distances. Birds alighting on infected premises may also distribute the contagion wherever they go.

TREATMENT.—The best authorities on the subject regard genuine cholera as practically incurable. It is said that none of the alleged remedies have proved effective in cases known to be true cholera, and the presumption is that the persons supposing they had cured cholera with them were treating some other disease. While treatment of affected individuals is regarded as futile, the spread of the disease may be limited and the disease stamped out by disinfection to destroy the germs on the premises, and by proper measures to prevent their further distribution.

Woods, in the article to which reference has been made, gives this very concise statement of the method of dealing with cholera:—“As soon as the disease is discovered establish a pest house remote from other poultry buildings, a place that can be easily and thoroughly disinfected. Isolate all suspected cases in the pest house as soon as you can find them. Give these birds a few drops of creolin or sulpho-naphthol in their drinking water (just enough to turn it faintly milky), or give them drinking water containing one-tenth of a grain tablet of corrosive sublimate to the quart of water. Some of the quarantined birds may recover without other medicine than that advised for the drinking water. Individual cases may be treated in the case of valuable birds. Give a one one-thousandth of a grain tablet of corrosive sublimate (mercury bichloride) every three hours. Food given should be easily digested soft food, and fed sparingly. All droppings should be disinfected and burned or buried deeply. All birds which show marked symptoms of the disease had better be killed and cremated at once. Kill them by a sharp blow with a blunt club, breaking the neck. Do not draw blood, as the blood is infectious, and you do not want to spill it. If they bleed scrape up all blood and burn with the body, and disinfect the place where it fell. Rake up and burn all litter used in houses or runs occupied by infected birds. Spray the runs and all parts of the buildings with a strong solution of creolin or sulpho-naphthol, or a one per cent solution of sulphuric acid in water. The proportion of creolin or sulpho-naphthol is

about one teaspoonful to an ordinary wooden bucketful of drinking water. Do not use any litter until you are sure that the disease is eradicated. Thoroughly disinfect everything that could possibly be contaminated by the infected fowls, and repeat this as often as you find a new case. The runs or yards should be thoroughly disinfected, and should be plowed up often. If no new cases develop within twenty days after the last known case was quarantined and the premises disinfected, the disease may be regarded as checked. Remember that it is a germ disease, highly contagious, and that prompt recognition and treatment and thorough disinfection are the only means of stamping it out."

Salmon's directions for treatment (which Woods follows in a general way) while much the same, note some additional points worth repeating and observing. He suggests that, if possible the healthy fowls be removed to new houses and yards, and that they be kept confined to small runs which may be thoroughly disinfected as necessary. He calls attention to the impossibility of disinfecting a large range, and the difficulty of checking the disease while fowls are at large on an infected range. An outbreak of cholera on a farm where the fowls have free range usually means the extermination of that flock, and practically the abandonment of poultry keeping for several years until by natural processes the germs have been destroyed.

Aspergillosis.

Aspergillosis, or mycosis of the air passages, is one of the diseases often mistaken for tuberculosis. It seems to be a very common disease. When only the outward symptoms are noted poultry keepers who have it in their flocks are likely to call it "going light." If post mortem examinations of birds dying of it are made, tubercles caused by the fungi from which the disease takes its name, may be found, and from their resemblance to consumptive tubercles are generally taken as a symptom of that disease. I think there is no doubt that a great many unaccountable deaths and epidemics in the poultry yard are due to this disease. Many cases are reported to me which might be aspergillosis, but it is only occasionally that the accompanying statement of symptoms and conditions mentions conditions which, considered in connection with the symptoms, make it reasonably certain that the disease is

aspergillosis. Yet from the fact that the conditions favorable to the disease are very common, I suspect that a great many poultry keepers have the disease and do not know it.

CAUSE.—The disease is caused by fungi which grow upon dead or decaying (including musty or moldy) matter, and being taken into the system in respiration or with the food, these fungi may increase in the internal organs of the fowl so much as to seriously interfere with their functions, producing emaciation and death. The interference with the action of the affected organs produces complications with various diseases, and when these develop a pronounced type it is usual to look for the cause of the discovered disease, and, finding it, look no further.

The several kinds of molds or fungi which cause aspergillosis develop, especially in warm summer weather, on musty hay and straw, and also on musty and moldy grains. The plainest cases reported to me have been cases where musty litter was used. In such instances the disease has often seemed to be of a contagious character, nearly the entire flock being affected. Suspected cases of aspergillosis from the use of musty and moldy grains have rarely shown an epidemic character. Many fowls seem to be immune alike to the attacks of these fungi and to any other bad effects from damaged grain. It is probable that in many, if not most instances where feeding damaged grains gave bad results almost immediately that the trouble was due to these fungi.

TREATMENT.—Medical treatment of the disease when once established is not often effective. Neither of the treatments mentioned by Salmon, fumigation with tar vapor, and internal applications of tincture of iodine or iodide of potassium, is accompanied by definite instructions satisfactory to one who wants specific directions how to proceed. The fumigation requires judgment to avoid getting the vapor so dense as to injure the fowls. The dose of the other remedies mentioned is not given. This lack of specific directions is not of importance in cases where treatment is futile. The prevention of the disease is easily accomplished by avoiding the use of musty and moldy litter, and of damaged grains — particularly grains in which molding or mustiness seems to be actively progressing. The absolute prohibition of the use of all grains, foods, or litter not known to be "sterilized" is not necessary. Under

ordinary conditions very few, if any, fowls would be seriously affected by occasional use of slightly musty or moldy materials or foods, but the constant use of such articles is dangerous.

Anemia and Allied Diseases.

Poultry keepers often observe in their flocks a small percentage of fowls which at first attract attention by the lack of color in the comb and head, and then gradually become emaciated and waste away without any pronounced symptoms of disease. Such fowls are sometimes supposed to be "consumptive," but the term in common use among poultry keepers to describe them is "going light." The condition of such fowls has long been recognized as due to an impoverished condition of the blood. A human being showing the same symptoms we say is "anemic." Authorities on poultry diseases generally have adopted that term, and call the disease in fowls *anemia*. Salmon entirely ignores the general use of the term anemia, and calls going light "asthenia," a term which applies rather to the failing vitality or strength of the fowl, and is indeed a Greek equivalent for the phrase, "going light." The disease he describes as asthenia he attributes (apparently on the basis of a single investigation by Dr. Dawson), to a peculiar germ, different from the microbes of bacterial enteritis, but producing the same effects, and requiring the same treatment. His use of terms is unfortunate, for what he calls asthenia is clearly not what is commonly called "going light," though fowls with that disease, as with many others, may become greatly emaciated. His renaming of diseases was especially unfortunate in this case, because under the topic, "Infectious Leukemia," he gave one of the best descriptions of "anemia" I have seen, and the effect of this has been largely lost by giving to the disease an unfamiliar name. As "leukemia," his disease attracted little attention. Had he published the matter as relating to anemia, and throwing new light on the disease commonly called by that name, it is probable that his contribution to the subject would have helped many to a better understanding of a trouble. The most important point of difference between the "anemia" of the older authorities, and the "leukemia" described by Salmon, is in the progress of the disease. Anemia often drags along for several months, leukemia is

said to result generally in death in four or five days, but occasionally not for two or three weeks.

For the time the subject is still further complicated by Curtice's discussion in a bulletin of the Rhode Island Experiment Station, of a disease which appears to be identical with the leukemia of Salmon, and which Curtice there calls "fowl typhoid."

It is possible that these differences of opinion will at sometime be harmonized, and a fuller and better understanding of the subject brought about. Such superficial comparisons of their arguments and differences as a non-professional student of the subject can make, suggest that further investigation and conference of investigators, may show that these differently named diseases are either types of the same disease differing in virulence and duration, or that conditions which, in most instances, produce the disease, of varying duration, commonly known as anemia, may, in the presence of certain germs, cause more malignant disturbances. It is not unreasonable to suppose that between ordinary "anemia" and leukemia and fowl typhoid, (whether these two are the same or different), there will be found such relation as has been noted as existing between roup and diphtheria, congestion of the lungs and pneumonia, and others that might be mentioned.

With this statement of the confusion of authorities in regard to these diseases, and of a possible relation between them, I think the reader will get a more satisfactory idea of the subject if I describe them in order.

Anemia.

SYMPTOMS.—The conspicuous symptoms of anemia are a bloodless anemic appearance and great debility and loss of flesh increasing with the advance of the disease, until the fowl seems to be nothing but feathers, skin, and bone. Under any conditions some fowls may become anemic, but these cases are so rare as to hardly attract notice. More often the fowls in a flock, one or two at a time, or possibly more in a large flock, waste away, the number affected gradually increasing as the disease is allowed to go unchecked.

CAUSES.—Lack of fresh pure air and sunshine appear to be the principal causes of anemia. Under such conditions the blood does not get its required quantity of oxygen, and if the conditions are

constant the blood is soon in a condition which compares with normal healthy blood, as the color of a plant grown indoors does with one grown in the open air. It is no longer good "red blood." It is deficient in red blood corpuscles. A very elementary knowledge of the functions of the blood is all that is necessary to show how, when such a condition of the blood is reached, every function of the fowl is at once affected, and fails to perform its part. There are other causes also. Lack of proper food, or of nourishing food, means impoverished, "thin" blood, and many diseases by their interference with vital functions cause anemic conditions.

TREATMENT.—The treatment of this disease is extremely simple from the point of view of the poultryman whose sanitary conditions are good, and who has little of it. It is simple in statement for any case — but not always easy to put into practice. A great many people keep fowls where it is difficult or impossible to secure good sanitary conditions. Sometimes they do not realize how far wrong the conditions under which their fowls are kept are, and the steps they take to correct them, while in the right direction are so far short of what is required that they produce little effect. Even with fully adequate improvements in sanitation the complete restoration of the fowls to health requires time. Tonics help to improve digestion and also to enrich the blood. For the latter purpose iron is especially useful. Sanborn suggests a teaspoonful of tincture of iron and ten drops tincture of *nux vomica* to the pint of drinking water.

As a matter of general policy it is better to kill birds that are conspicuously anemic, and apply the treatment only to those in which the disease has not reached an advanced stage.

Leukemia.

The name leukemia (white blood) was applied by Moore and Salmon to a disease which the former investigated in several localities. Its characteristic symptoms are a condition of the blood and a general debility such as are found in anemia, from which it differs. While it is described by these authorities as a contagious disease due to a particular germ, it is admitted that healthy fowls cooped with diseased ones did not take the disease, and that "it is not improbable that outbreaks may occur from filth, without the necessity of imparting contagion."

It differs from anemia, as described above, in that its course is more rapid, and it does not readily yield to treatment. The preventive and remedial measures recommended are practically the same as for anemia. The disease is said to be frequently mistaken for fowl cholera. Post mortem examinations made showed alterations only in the blood and liver, the red corpuscles being greatly reduced in number, and the white ones much increased, while the liver was somewhat enlarged and dark colored.

Fowl Typhoid.

Here again we have "a disease sometimes mistaken for cholera." Perhaps a more correct description of the disease and its status would be one of the diseases generally supposed to be cholera, for to most poultrymen typhoid, in connection with fowls, is an unknown term. In fact, as stated by those who described it, the disease cannot be identified except by bacteriological methods. That being the case, for all practical purposes the typhoid germ in fowls may be regarded as one of the germs causing the general symptoms popularly known as cholera. The method of dealing with it is the same: Kill affected fowls, and disinfect premises, and give well fowls treatment as for cholera (page 95). If one is curious to know the precise character of such a disease affecting his flock, he should try to interest the veterinary department of his state agricultural college in it; but the control of any of these epidemic diseases can almost invariably be accomplished within a few weeks by disinfection, good sanitation, and correct treatment.

Black Head of Turkeys.

This is a contagious disease affecting the liver and intestines, (particularly the cæcum, or "blind gut"). The disease has been most prevalent in eastern and southeastern sections where turkeys have long been grown on the same ground, but instances of it as epidemic in other sections seem to be on the increase. The disease develops no special external symptoms until in an advanced stage. Then the peculiar mark of its presence is the dark color of the heads of its victims, from which it takes its name "black head."

SYMPTOMS.—Besides the discoloration of the head indicated above, the conspicuous symptoms of this disease is diarrhea, resulting from the condition of the intestines, weakness, and

emaciation. A post mortem examination shows the cæcum inflamed and sometimes clogged with tumorous matter, and the liver enlarged and discolored with whitish or yellowish spots.

CAUSE.—The disease is caused by a parasite (*amoeba meleagridis*), which is supposed to be taken into the system with food and drink. Salmon says: "The course of the disease is variable. In some cases it develops rapidly after infection, and the affected birds die in from two to six weeks. In other cases the morbid processes may come to a standstill, but the amount of dead tissue in the cæca and liver may be so great as to favor the entrance of bacteria, which are directly responsible for the death of the bird late in the summer or fall. In still other cases regenerative processes may begin and lead to complete and permanent recovery. During the course of the affection, the parasitic protozoa multiply in the cæca, they are mixed with the intestinal contents, and many of them are discharged with the excrement. In this way the contagion is spread. The food and drinking water become contaminated with particles of excrement containing the parasites, the latter are taken by healthy birds into the digestive canal, along which they proceed until the cæca are reached."

TREATMENT.—Medical treatment of blackhead in individuals in which it has developed so much as to show the external symptoms which identify it is generally ineffective. Such treatment as is given has for its object the check of the disease in fowls in which it is less developed, building them up with tonics, and giving drugs which either destroy the parasites which cause it, or check their increase. Whether medicines are used or not, the sick fowls should be isolated, and such measures taken for the disinfection of the premises as are practicable.

Where an infected flock has had the range of the farm, or of such parts of it as must be used for turkeys distributing contamination everywhere, the only disinfection that can be effective is to keep infected birds off the land, and let nature destroy the germs of disease. While the point has never been experimentally demonstrated, it is believed by some of those best informed on the subject that the contamination of the land does not continue after the season in which infected fowls were on it, and that it is safe the following season for turkeys free from the disease. Where there has been

serious trouble with black head it is advised to clean out the infected stock and start new the next season, either with stock from a flock free from the disease, or by hatching turkey eggs under hens. A comparison of the experiences of different turkey growers with this disease suggest the probability that the germs which cause it are almost universally distributed, but are virtually harmless unless weak stock and unsanitary conditions especially favor their multiplication. Many turkey raisers are emphatic in expressions of opinion that black head will give no trouble to those who are careful as they should be to use only vigorous breeding stock, and who give the turkeys a range large enough to be kept in sanitary condition by natural agencies, and are careful to keep the feeding grounds and utensils and the roosting places which the turkeys frequent near the outbuildings, clean and in wholesome condition. While the accounts of outbreaks of blackhead do not fully substantiate this view, they do indicate that there is a great deal of truth in it, while the stress laid upon sanitary measures of prevention tends to strengthen the idea that those who suffer much from the ravages of this disease are themselves largely to blame for it. In that section of Rhode Island, and contiguous area in Connecticut where the growing of turkeys was once an industry of great local importance, the decline in the industry is commonly attributed to black head; but there are to be found there persons interested in turkey growing who maintain that this view of the case is superficial, that black head is a result, not the cause, and that the true cause of the decline of the industry is to be found in the changed attitude of the people toward the tasks involved in the successful growing of turkeys.

For medical treatment for mildly affected birds Salmon suggests :—

Sulphur 5 to 10 grains, sulphate of iron 1 grain, or—

Benzonaphthol 1 grain, salicylate of bismuth 1 grain.

Sulphur 10 grains, sulphate of iron 1 grain, sulphate of quinine 1 grain.

These remedies are to be given two or three times a day, and continued for a considerable time. The doses mentioned are for turkeys weighing four or five pounds each, that being about the weight at which most of those which require treatment will have arrived. The disease attacks mostly young turkeys, and in these does not generally show outward symptoms until the season is well advanced.

CHAPTER IX.

Diseases of the Reproductive Organs.

General Remarks.

THE diseases of the reproductive organs of fowls do not require in a work of this kind the extended discussion given to some of the other topics treated. Not that such diseases are not important, for they are undoubtedly of very common occurrence, and productive of sterileness in males, and barrenness in females, thus often seriously affecting egg production and the fertility of eggs used for hatching. It often appears, too, that disorders of the reproductive organs are followed by the development in individuals of diseases which are readily traced to other causes. In such cases it may reasonably be assumed that the fowl was able to withstand the causes, whether germ or other causes, of that particular disease, until the impairment of its vitality by the disease of the reproductive organs. There is also reason to believe that in many cases when some of the common causes of cold and roup are present under conditions in which it would be expected that the fowls would contract severe colds, yet colds do not develop in the common form with plain external symptoms, the cold "settles" in the organs of reproduction, causing disorders of various kinds which interfere with the operation of those functions of fowls which are of first importance to the poultry keeper, even when they are not followed by a permanent impairment of the organs, or the development of other diseases.

On all such points, however, and to a lesser extent on the entire subject of diseases of the reproductive organs of fowls, we have little definite knowledge. The subject has been given but little attention — not enough to make it clear whether or not results of practical value would be likely to come from a thorough investigation of it. As the situation is today we can deal only with those phases of disorders of the reproductive organs of which we get unmistakable outward manifestations, such as abnormalities in eggs, and obstructed laying — superficial things which, as we find them, seem to have no connection whatever with the primary reproductive organs. When a post mortem examination of a hen shows the ovaries in diseased condition, they may be described according to the symptoms as tumorous, or gangrened, or atrophied; or the organs of the male may be found distorted in form, or enlarged, or wasted, and we can describe whatever condition exists; but further than that our authorities have not gone. We do not know why and how these conditions develop. Hence we can have no definite rules for preventing or avoiding them. We cannot even ascertain the existence of troubles of this class with any certainty during the life of the fowl, and, practically, the attitude of the poultrymen toward these diseases — with the exceptions noted — is one of suspicion merely. He suspects such troubles when he has no other way of accounting for conditions which might result from them. After the death of a fowl the existence of diseases of this kind is easily ascertained. In isolated cases this knowledge has no practical value. It satisfies curiosity, but affords no data for dealing with other suspected cases. When numerous cases are found in a flock the presumption is that the stock has a peculiar tendency to that form of trouble, and the best policy is to clean out that stock and start with new stock.

Diseases of the Reproductive Organs of the Female.

For the present purpose the reproductive organs of the hen may be briefly described as consisting of the ovary, from which the eggs originate and the yolk is developed, and the oviduct down which the egg passes, the fertilization of the egg and the production of the white and the shell being accomplished in the oviduct. A diseased condition of the ovary may be suspected when a hen of

mature age fails to lay at the natural laying season. At other seasons there may be inactivity of the ovary without disease, but when a hen absolutely fails to produce eggs in spring it is reasonable to presume that there is an abnormal condition of the ovary. This will explain why it is that poultry keepers whose hens are thought to be too fat can reduce the fat and yet the hens will not lay — the truth probably being that the hens have grown fat because the ovaries not being active, there was a surplus of food available for fat. Evidently reducing the fat in such cases would not reach the root of the trouble.

Diseased conditions of the oviduct are more specifically indicated by outward symptoms.

Diseases of the Ovary.

ATROPHY OF THE OVARY.—The ovary fails to develop, or having developed, becomes reduced in size and useless. An occasional result of this trouble is the development of male characteristics, enlargement of the comb, growth of spurs, and the production of feathers somewhat resembling those of the male. These cases of “hermaphroditism,” however, are extremely rare. Many poultry keepers have never seen such a fowl, while atrophy of the ovary with no external indications of such condition or change occur with more or less frequency in every yard.

GANGRENE OF THE OVARY.—In this disease the ova attached to the ovary are found in a state of decomposition, dark colored and filled with liquid, in fact the yolks are rotten. This condition will ultimately cause the death of the hen, but not nearly all hens in this condition die from the disease. A poultry keeper who made it a practice to carefully examine the entrails of all hens killed and drawn at home, once told me it was surprising how many hens he found in some stage of this disease. Salmon advances the opinion that it may be an infectious disease. He bases this opinion on the frequently observed presence of bacteria in the affected parts.

TUMOR AND CANCER OF THE OVARY.—Tumors of the ovary are of frequent occurrence, and vary considerably in character. The most common form consists of a tumorous growth about the yolks of eggs that for some reason have not entered the oviduct. In most

observed cases they kill the fowl, and the condition is not discovered until examination after death, but occasionally a tumorous egg is detached from the ovary and passes out through the oviduct; and from several reports of such cases that have reached me I judge it possible for the ovary, relieved of this abnormal growth, to again become active and produce perfect eggs.

Some observed phenomena of egg production indicate that though the existence and character of the diseases of the ovary described cannot be determined in the life of the fowl, and the diseases cannot be intelligently treated, many hens do have ovarian troubles and recover from them.

Diseases of the Oviduct.

The common diseases of the oviduct are generally accompanied by marked external symptoms, especially in their later stages. In some of them — as in inflammation of the oviduct,—there may be external symptoms early in the progress of disease, but these are not characteristic, and afford no special clue to the nature of the trouble. Indeed the earlier symptoms are so like those of constipation that the poultryman who observes them is likely to suppose that that or some disease in which constipation may be a conspicuous symptom is the trouble. Such an error might be to his advantage if it led to prompt dosing and dieting for constipation, for the treatments for these two troubles, while not in every respect identical, are so much alike that the treatment for constipation may be expected to accomplish most of the results aimed at in treatment for inflammation of the oviduct. As may be noted, these diseases present parallel features — similar conditions in organs having a degree of similarity in structure and functions. The symptoms of the other troubles of the oviduct are of more rapid development, and generally unmistakable in character.

Egg Bound.

This trouble is rather mechanical and accidental in occurrence. It is not properly a disease, but diseased conditions of some part of the oviduct may cause it or result from it. It is of such common occurrence that poultry keepers generally become acquainted with it early in their experience.

SYMPTOMS.—These vary somewhat in different birds. The most common symptoms — frequent visits to the nest without laying; walking about with the body almost perpendicular, and the legs well spread; and the visible condition of inability to complete the extrusion of an egg. The first two symptoms occur in the less serious cases, or when the egg though not progressing normally to extrusion threatens no immediate danger to the fowl. As everyone who has closely observed the habits of hens has noted, the symptoms and condition we are discussing are present in mild form or for a very short time in the production of nearly every egg. It is only in their extreme development that they need cause the poultry keeper concern. The hen that visits the nest often without result may yet deposit her egg without injury. The hen that waddles about the yard in some distress, but seemingly more in discomfort than in pain, may drop the egg anywhere, and in a short time be all right again. A hen may halt with an egg half way protruding for some minutes, and then succeed in passing it without injury to herself.

CAUSES.—In my own experience by far the most common causes of egg bound are relatively large eggs, and heavy laying, the frequent straining of the parts inflaming them, rendering them less elastic, and thereby making the passage of the egg more difficult. Such strains affect the ligaments and muscles of the adjacent parts as well as the membrane of the oviduct itself, hence we often see lameness and paralysis resulting from trouble in laying. Overfat hens are said to be especially liable to trouble in passing eggs, and constipation of the bowels increases the danger of trouble in passing the egg.

TREATMENT.—Unless it appears plain that unless given assistance the hen either cannot pass the egg or will injure herself in passing it, it is best to let her alone. From the economical point of view it is better to kill a hen so seriously in trouble from this cause as to need assistance, for a hen that has had this trouble once is likely to have it again, and in most cases the death of the hen in laying is only a question of time. I have known of hens successfully treated for egg bound several times, then die in that condition.

A hen may be found with an egg partially extruded and unable to complete the passage. In that case immerse the vent in warm

water, or with the fingers and some warm lard or vaseline anoint the protruding membrane which surrounds the egg until it relaxes enough to allow the passage of the egg. This operation must be very gently and carefully performed or it may, by injuring the parts, do more harm than good. The process is slow; as much as half an hour may be required before it is successful.

If the egg is lodged within the oviduct just inside the vent, which will not distend enough even to allow it to begin the passage through, immerse in warm water as described above, or inject a little olive oil or salad oil. In different cases a combination of the two treatments may be used, immersing first in warm water, then injecting oil, and by manipulation with the fingers endeavoring to assist the passage of the egg. Eggs are sometimes broken within the oviduct. In many such cases the broken egg is passed by the fowl without any serious consequences. Sometimes the egg is passed, and the fowl after moping around for a few days, dies, either from inflammation and gangrene resulting from injury to the oviduct by pieces of broken shell, or from injuries resulting from the accident by which the egg was broken. The same treatment used for a whole egg obstructing the oviduct may be applied when the egg is broken, but the presence of broken shell adds to the risks. In all cases of difficult laying the diet should be light, contain little stimulating food, and may have more soft and laxative food than is ordinarily advisable. Salmon recommends giving fluid extract of ergot in five drop doses three times a day to contract the parts unduly expanded and strained. It is to be noted that the complete success of an operation cannot be known for several days. Many hens which after an operation go about and eat as usual, will within a few days develop symptoms which show that in the process or treatment they were internally injured beyond possibility of recovery.

Prolapsus of the Oviduct.

SYMPTOM AND CAUSES.—Hens are sometimes found with what appears to be a red membranous sack protruding from the vent. This is usually the lower part of the oviduct, which normally would protrude somewhat as the egg was extruded, but would either instantly or within a very short time, return to its normal position within the body. If it does not do so, it soon becomes

dry and cannot return. The same condition sometimes occurs also as the result of efforts to expel an egg lodged in the lower part of the oviduct. In these latter cases the protrusion is likely to be much smaller, though there is no uniformity of symptoms attending different developments of the trouble. Sometimes a small protrusion at the vent is seen in both females and males. This is protrusion of the bowel, similar in cause and character to piles.

The protruding bowel or oviduct, if not soon replaced, becomes very much inflamed; mortification and the death of the fowl follow.

TREATMENT.—If there is found to be an egg in the passage, treat as for egg bound. If no egg is there, apply vaseline, lard, or oil to the protrusion, and by pressure with the fingers work it back to its place. See that the parts are clean before being returned. If soiled, wash with warm water. Further treatment is the same as for inflammation of the oviduct. Ergot, as recommended for cases of egg bound, may be given to contract the parts and keep them from relapsing.

Rupture of the Oviduct.

It often happens that the oviduct, or the vent, is torn in the passage of an egg. A slight rupture at the vent may heal very quickly without treatment. An internal rupture is likely to have more serious consequences. Mortification and gangrene may set in, and the fowl die from these, or if the production of eggs continues, the rupture may be enlarged until one or more eggs drop through its aperture into the abdomen, where they may remain for days, or even weeks, and the fowl continue to live, though the trouble is incurable, and death from it must finally come.

Inflammation of the Oviduct.

SYMPTOMS.—Inflammation of the oviduct may occur either as a cause or a result of the various troubles just considered, or it may develop from some of the causes which cause them. The diseases of the oviduct are so complicated that we cannot readily differentiate them. Inflammation may appear and disappear without any of the extreme results mentioned above being developed. It is then indicated chiefly by the production of abnormal eggs, eggs without shells, or with distorted shells. The only other character-

istic symptom is a restless going to and from the nest usually without laying, and this is not an exclusive symptom, but occurs also in diseases of the ovary.

TREATMENT.—The treatment of a disease like this must always be somewhat a matter of guess work. Treatments recommended are :—

A diet free from heating and stimulating foods, quiet, Epsom salts 20 grains, bicarbonate of soda, followed with one-half drop tincture of aconite, three times a day.—**SALMON.**

Teaspoonful of sweet oil every four hours.—**VALE.**

Give one-half teaspoonful sulphate of magnesia in a tablespoonful of water. Keep the bowels open by the use of the magnesia, and give plain unstimulating food.—**SANBORN.**

Abnormal Eggs.

The normal egg consists of a yolk, surrounded by albuminous matter, the white, both enclosed in a shell, firm in texture, regular in outline, and, in the case of an average hen, weighing about an ounce and a half to two ounces. Eggs notably larger or smaller than the weights indicated are usually in some way abnormal. A very large egg is likely to contain two yolks, a very small one none. Irregularly shaped shells, and notably rough or porous shells, are commonly attributed to some lack of full functional activity of the oviduct, but we have very little specific knowledge of the subject. Some hens never lay an egg perfect in form and shell; some lay imperfect eggs when out of condition in various ways, but perfect eggs when in perfect condition. The thickness and texture of the shell depend generally on an abundance of shell forming material being available, but there are many hens that lay eggs with poor shells though liberally supplied with mineral matters supposed to be beneficial in such cases. In that event we are forced to assume a derangement of function which interferes with the proper utilization of available material.

SOFT SHELLED EGGS—May result from inflammation of the oviduct, or from any condition of the oviduct which interferes with the normal deposit of shell on the egg as it passes through; from fright (causing an abortion); from weakness (making the fowl unable to retain the accumulating eggs in the oviduct until those

most advanced are completely developed); from an excessive rate of egg production, the eggs being separated from the ovary and forced through the oviduct more rapidly than is consistent with full formation, or beyond the normal ability of the fowl to carry eggs in process of development. The remedy consists in applying one or more treatments, as in the judgment of the poultry keeper there seems reason to suppose they may be effective. It may be necessary to give more shell forming material, or to avoid stimulating food, or to separate the hen from the male, or to do all of these things.

BLOODY EGGS.—A clot of blood found within the egg generally indicates the rupture of a small blood vessel of the ovary. The occasional occurrence of such clots need cause no concern. If they are of frequent occurrence, and especially if they are laid regularly by one or more hens, it is well to locate those hens and kill them for the table. Such hens should not be used for breeding purposes. There is much reason to suppose that all affections of the reproductive organs are transmitted to the progeny with probably greater regularity than any other class of diseases or faults.

A little blood on the shell of an egg indicates a tear or rupture of the oviduct or vent, and is serious in proportion to the amount of blood noted, and the frequency of the occurrence. A pullet's first egg, unless very small, is likely to have some blood on the shell.

Diseases of the Male Organs of Reproduction.

Very little attention has been given by authorities on poultry ailments to diseases affecting these organs, and practically no attention by poultrymen. It is not possible to identify any of them during the life of the fowl, there being no characteristic external symptoms. As far as observed these diseases affect only the testicles. Examinations have shown enlargement, fatty degeneration, and cancer of the testicles. Such conditions may be suspected in case of a male which proves infertile, but no specific treatment is possible. It is likely that other parts of the reproductive organs of the male also have their peculiar diseases, but no special study of them has been made, if we except the next described trouble, which affects both males and females.

Vent Gleet.

This is a venereal disease of fowls, affecting both sexes, contagious in character, and transmitted from fowl to fowl in copulation.

SYMPTOMS.—Contraction and redness of the vent and adjacent skin, both of the bowel and of the surface, with a whitish yellow discharge from the vent.

TREATMENT.—"Wet a piece of cotton in a solution of ten grains sulpho carbolate of zinc, and five drops oil of wintergreen to one gill of water, and insert at the vent night and morning; or give as an injection five grains sulphate of zinc in one-half pint of water. Even with the best of treatment the disease will run a course of ten days."—SANBORN.

CHAPTER X.

Diseases of the Skin.

UNDER this head, for the purposes of this work are grouped the diseases of the skin of head and appurtenances, body, legs, and feet. Technically this grouping might be criticised as in violation of both scientific method and natural system, but there is a reason for considering these diseases together, and also for not considering, as some authorities do, lice and the blood sucking mites in connection with skin diseases caused by less active and less readily identified parasites.

The common diseases of the comb, skin, and feet may all be regarded as diseases of the skin. Some of the worst skin diseases affect both the comb and the skin of the head, neck, and body. The diseases of the legs and feet which cause poultrymen most trouble are diseases of the skin of those parts.

The diseases treated together here are mostly contagious, but slow in development, and not difficult to cure if taken in time, or to eradicate if persistently followed up. In so far as they are parasitic there is this essential difference between the treatment of them and of lice and red mites—that treatment must be by local applications to the affected parts, while with lice and red mites we treat most easily and effectively without handling the fowls, and without giving them either individually or collectively any specific treatment.

The skin diseases of most common occurrence are chicken pox—affecting the head; white comb, or favus—beginning usually on the comb, and often confined to the head, yet frequently extending to all parts of the body; scabies or mange—affecting first and principally the skin of the body, and destroying both cuticle and feathers, but often extending to the bare skin of the head; scaly leg—affecting the skin of the shank and foot; and bumble foot, a diseased condition of the skin of the sole of the foot. With the exception of the last named they are contagious.

Chicken Pox.

This disease, while quite common in the northern United States, is there considered a mild disease. Through the south, and in Hawaii it is far more prevalent, and apparently more virulent. In north temperate latitudes little is heard of it except in the fall, especially in a cold wet fall. From warmer regions complaints of "sore head," as it is popularly called when it is most troublesome, come at all seasons.

SYMPTOMS.—Small ulcers or pimples on the face, about the eyes and beak mostly, but sometimes spreading, running together and making a large sore with thick scab. Should one fail to notice the eruptions in the early stages he may not suspect the true character of the disease while only one or two fowls are affected, for when the scabs turn dark they may look like scabs from injuries in fighting.

CAUSE.—Salmon (in "Diseases of Poultry") goes into the details of the investigation of this disease, and concludes that it is caused by fungi, which multiply especially in accumulations of damp excrement of fowls, but may develop in ordinarily clean quarters under a combination of favorable conditions. Dull damp weather particularly favors the development of chicken pox, hence a cloudy and wet period in late summer and early fall is likely to bring numerous epidemics of chicken pox.

TREATMENT.—In the single outbreak of this disease, which I had in my own yards—in two broods of late chicks—after applying carbolated vaseline to the sores on the heads of the hen and brood first affected, I changed both lots to dryer quarters, and let the disease take its course. Both hens had very bad cases, yet, except for

looks neither seemed at all the worse for the disease. They ate and foraged about contentedly, and the molt which they were then undergoing seemed not at all retarded. The smaller and weaker chicks, without exception, took the disease, and either died from it, or were so exhausted by it that when the disease had run its course I killed them as worthless. Large strong chicks either did not take it at all, or the attack was very light. Some poultry-men paint the ulcers with tincture of iodine, or with tincture of iodine mixed with ten per cent of carbolic acid. Salmon, while mentioning this remedy, advises its use only when milder remedies have failed. Instead of the carbolated vaseline, glycerine with two per cent of carbolic acid may be used. It is recommended to give these treatments twice daily, but if from lack of opportunity, or because of the number of birds to be treated, this is impracticable, less frequent treatments may be given.

White Comb—Favus.

This is a disease which, in this country, is comparatively rare, though from the discussion of it by European writers it seems to be very common in the cities of England and on the continent. It is said to affect human beings and animals as well as fowls, and perhaps its prevalence among poultry in Europe may be due to its prevalence among persons or animals coming in contact with the fowls. It is a disease of a class much more common among people in the old countries than here. It is known as *favus* when it affects people. Some authorities treat it as a distinct contagious disease; others consider it a condition due to anemia. It is possible that the disease develops originally in anemic poultry, and that the surroundings which produce anemic poultry are favorable to the beginning as the condition of such poultry is to the growth of the disease. But when the disease is once established, and the symptom which gives it its common name becomes conspicuous and shows a serious disorder, it is highly contagious. The fact that writers treating "white comb" frequently confuse this and the more common disease which goes by the same popular name, gives rise to some uncertainty as to whether they are really different diseases or different stages or developments of the same disease.

SYMPTOMS.—The description of symptoms of *favus* or "white

comb," given by Salmon, is far the most satisfactory I have ever seen. He says: "The disease manifests itself by small white or light gray round or irregular spots, from the size of a pinhead to that of a dime, that extend and increase in number, until nearly all of the skin of the affected part is covered. An examination of these spots shows that a thin scale or crust has formed on the surface of the skin. The crust often develops in round or crescentric deposits, raised at the border and depressed at the center, giving to the spots a cup shaped appearance. The crust increases in thickness until in the course of a month it may be one-fourth inch or more in depth. It is then of a dirty white color, scaly and irregular on the surface. When the crust is removed the skin is seen to be irritated and slightly excoriated. The disease extends from the bare parts of the head to the parts of the body covered with feathers. The neck, the region about the vent, and the adjoining surfaces are then invaded. The feathers become dry, erect, and brittle. They break and fall off, leaving the skin denuded and covered with crusts, which are often cup shaped, having in the center the depression in which the feather was fixed."

CAUSE.—This disease is caused by a fungus. It is said that this fungus cannot establish itself on a sound skin, but takes effect only when there is a break, a scratch, or abrasion of the skin with which it comes in contact. Once established it seems to spread steadily, even under good sanitary conditions, unless measures are taken to check it.

TREATMENT.—In its early stages favus yields readily to treatment. The difficulty in treating it is, that because at first it does not seem to be serious, and does not much affect the general condition of the fowl, the poultry keeper pays little attention to it, until the stage when treatment would be easy has passed. Such simple remedies as cocoanut oil, lard, vaseline, seem to be effective when applied before the crusts become thick. After that condition is reached, however, it is necessary to remove the crusts before making applications. Otherwise the ointments applied do not penetrate readily to the skin where the growth is attached. The crusts may be removed by rubbing with a blunt edged knife, the edge of a spoon handle, or a small piece of wood whittled to an edge. The process is slow and tedious, and except in case of a very valuable

bird not worth while. After removing the crusts applications of ointment should be made daily until all evidences of disease disappear. Numerous different articles and mixtures have been recommended.

Hill prescribes oxide of zinc and vaseline.

Sanborn, oleate of zinc one heaping teaspoonful to one-half cup of vaseline.

Salmon mentions a number of remedies :

Tincture of iodine.

Benzine 1 part, in soft soap 20 parts.

Carbolic acid 1 part, in soft soap 20 parts.

Calomel, or red oxide of mercury 1 part, in vaseline 8 parts.

The foregoing are relatively mild remedies. Where they fail and it is still desired to effect a cure if possible, he suggests :—

Nitrate of silver 3 grains, with one-half ounce of vaseline.

Or, as a last resort :—Corrosive sublimate 10 grains, in an ounce of water.

White Comb — “Scurf.”

This trouble Vale describes as “a fine white scurf on the comb like a white powder. This is composed of minute scales of the scarf-skin detached from the comb, which is usually pale and flabby.” It is said to require no medicinal treatment. It is considered a result of anemia, and to disappear with corrected diet and more sanitary surroundings.

Scabies.

This is a disease, which being produced by a mite, ought from some considerations to be treated in the chapter on external parasites. The effects of attacks of this mite, known as *Sarcoptes lævis*, or “the depluming scab mite,” however, produce a diseased condition of the skin and a loss of feathers, while the tenacious character of the parasite makes it necessary to treat fowls individually, by repeated local applications. Also, many cases are reported where from the descriptions given it is hard to distinguish between scabies and favus appearing first upon the body of the fowl.

Scaly Leg.

This is one of the most unsightly and troublesome diseases of the poultry yard. Yards that have been used for years are rarely

free from it, and it almost always makes an early appearance on new premises that are heavily stocked or where care is not taken to keep it out. In its early stages it does not perceptibly affect the health or general condition of the fowls; but if allowed to develop it debilitates and often cripples them.

SYMPTOMS.—The scales of the feet and shanks become raised and loosened by the accumulation of a crusty substance beneath and between them. The symptoms are usually first observed at the junction of the shank and toes, and even before the crusty deposit has conspicuously loosened the scales and given it a rough appearance a thickening and enlarging of the part may be observed. As the disease extends the foot and toes and the whole shank become affected, the roughness being greatest on the foot and at the hock joint. In very bad cases toes are sometimes lost, the joints being destroyed.

CAUSE.—Scaly leg is caused by a mite (*sarcoptes mutans*), which burrows beneath the scales of the feet and legs. The cause is sometimes said to be deficiency of oil in the skin of the parts affected; but this is only the condition favorable for the attacks of the parasite. Fowls running in large grassy yards, or on moist land, or about stables where they scratch in manure heaps, are rarely affected with scaly leg unless it was contracted under other conditions, or the roosting places are allowed to become very foul. Fowls on very dry bare land, especially on alkali soils and in small yards filled with ashes or cinders, are most often affected, and under these conditions the poultry keeper must constantly war against the disease either in treatment of fowls or by special precautions against it. Where conditions are unfavorable to the workings of the parasite, scaly leg is avoided by carefully excluding all fowls having plainly developed cases of it from the premises. Some fowls seem immune to the attacks of the parasite, even when associated with fowls badly affected. These immune fowls are usually exceptionally vigorous, with an abundance of oil in skin and feathers.

TREATMENT.—The treatment of even mild cases of scaly leg must always be individual and local. The mites that cause the

trouble work and remain under the surface, and can be reached only by treatment with oils or ointments that are very penetrating or well rubbed in. For mild cases the easiest way to treat is by dipping the feet and legs to the hocks in a mixture of coal oil and linseed oil, the proportions of which may be varied according to the number of treatments to be given and the rapidity with which it is desired to make the cure complete. The larger the proportion of coal oil the more effective is the mixture, the coal oil being the energetic agent in detaching the scurf and dead scales, while the linseed oil allays the irritation. If the coal oil works too energetically scales and scurf may fall off before the new sound skin, which begins to form at once when the mites are checked, is developed, and the exposed parts will be left red and raw, this skin perhaps sloughing off, and another forming under it. This rapid treatment is to be advised only for emergencies, as when it is found that a bird which is to be exhibited must be treated for this trouble and ready to show in a very short time.

Except in hurry cases use not more than half coal oil, while for cases so little developed that the treatment is as much preventive as active, one part coal oil to two parts linseed oil is to be preferred.

When the scales though loosened still retain very nearly their normal position and the accumulation of crust is small, it is sufficient to dip the feet and legs in the oil mixture, hold them there a few seconds, then after holding the fowl over the vessel containing the oil to drip for a few seconds, replace it on the roost—the work being done as the fowls are on the roost in the evening. This treatment repeated at intervals of a week, is usually all that is necessary for such cases.

When the scales are badly damaged and the accumulation of scurf is large, treatment must begin with the removal of the scurf and loose scales. Sometimes this can be done gradually, by brushing with a stiff nail brush, doing this before each application of oil, as the entire accumulation cannot be removed at one treatment in this way without severity to the fowl. In such cases treatments should be given at intervals of two or three days, until the parts are in normal condition.

Salmon advises soaking the legs in warm water to which some soap has been added, until the debris on them is thoroughly softened and may be removed without causing bleeding; or coating the legs with soft soap, leaving them for twelve to twenty-four hours, and then soaking in warm water, and removing the scales by rubbing gently; and when the scales are thus removed apply daily, Helmerich's ointment, creolin ointment (1 to 10), carbolic ointment (1 to 10), or balsam of Peru. The objection to this treatment is the time required to soften and remove the scales. Another possible objection is that when the scales are removed rapidly the new skin and scales are not likely to be as good as when the removal and restoration proceed simultaneously and leisurely. I mention this as only a possible objection, because that result may not be as general as my own experience and observation lead me to suppose. I have preferred the coal oil-linseed oil treatment, because the coal oil works to remove dead matter for a long time after application, while the soaking process requires the poultryman to hold the fowl in the water for so long a period that only a few fowls could be treated in a day.

Other treatments recommended are :—

“A tin quart measure nearly full of water, with one tablespoonful of kerosene oil floating on top, and tied or fastened to a box to hold it firm. Then dip the legs (both at the same time) into the oil, holding them there one minute. Repeat after three days.”
—SALMON.

“Rub the parts daily with equal parts of vaseline and zinc ointment; or, in severe cases, with one ounce of sulphur, half an ounce of oxide of zinc, one dram of oil of tar, and two ounces of whale oil mixed together. Apply daily.” — HILL.

GENERAL PREVENTIVE TREATMENT. — Absolute exclusion of this disease from a flock of poultry is perhaps impossible. The mites are probably everywhere present in small numbers, but do no serious damage until conditions favorable to them allow them to increase to the point of becoming troublesome. In many stocks of poultry are birds somewhat affected, occasionally quite badly affected, which it does not seem worth while to treat, but which it is desirable to keep for a time as breeders or layers. There is no

serious objection to this provided the circumstance is not a regular annual occurrence. It should never happen after the first season that the poultry keeper has realized that the trouble is in his flock and must be eliminated.

A poultryman having come to this conclusion may practically get rid of the disease in a single season by proceeding in this way: Give all fowls several treatments by dipping. This will cure the mild cases and check the more advanced ones. After the first series of dippings dip the legs of all fowls in pens containing cases evidently not cured once a month until the breeding season is over, and the time has arrived to dispose of laying hens not to be kept another season. Then either sell or cure by special treatment every hen showing symptoms of scaly leg. If chicks are hatched and reared with hens avoid as far as possible the use of scaly legged hens in incubation, and on no account use as a mother a hen showing any symptoms of the disease. By following this course the disease is entirely stamped out in one season with much less effort than if an attempt had been made to cure every case. Having once got rid of it carefully examine for it every new fowl purchased, and either reject or isolate and cure affected fowls before allowing them to mix with others.

Some authorities suggest a very thorough cleaning and disinfection of premises, but that is not necessary unless conditions are very bad. When fowls must be kept on ground which absorbs the oil of the skin of feet and legs, rendering the fowls especially liable to this disease, it can be largely prevented by dipping the legs of all fowls occasionally in the coal oil-linseed oil mixture. It is good policy also to feed such fowls more liberally on fat forming foods, because lack of oil in the skin usually means lack of oil in the plumage, making the feathers more brittle and to some extent "taking the life out of them."

Bumblefoot.

SYMPTOMS.—Hardening of the skin of the sole of the foot, in neglected aggravated cases developing an abscess, making the use of the foot painful, and sometimes impossible.

CAUSES.—This trouble is usually associated with high perches and hard board floors or floors containing gravel or cinders large

enough to bruise the foot as the fowl alights in jumping from the perch. While this is the usual cause other causes are given. Salmon says corns which may develop into bumblefoot are caused by roosts being too small or narrow. Vale declares that in numerous cases examined by him constitutional disease was the predisposing cause. Sanborn says he has found it in chicks that had never been on a perch, and though he suspected it might be due to a splinter or thorn, had never found any foreign substance but glass.

TREATMENT.—Unless there is occasion to handle fowls and observe the condition of the feet, bumblefoot is not often discovered until the lameness of the fowl leads to an examination. By that time there is usually a large abscess formed.

If the condition is discovered before an abscess forms, treatment may be by paring the hardened skin, like a corn, then touching with a drop of acetic acid daily, or painting with tincture of iodine, or applying boric acid ointment (1 part boric acid, 5 parts vaseline).

If an abscess has formed use one of the following :

“Open the abscess with a clean, slender knife, wash out all the matter with warm water containing carbolic acid, then apply nitrate of silver—ten grains to one ounce of distilled water. Keep the bird on clean straw three or four days.”—SALMON.

“Soak the feet in warm water twice a day, and poultice until the inflammation is reduced. If an abscess in the sole is indicated by a soft, fluctuating swelling of the part, it should be opened with a sharp knife. After the poulticing is completed, apply boric acid ointment and protect the feet with pieces of cotton cloth. If the joints have become affected, and particularly if these communicate with the pus channels and are a seat of suppuration, the bird should be killed.”—SALMON.

English authorities advise a treatment more difficult for the amateur in fowl surgery :

“When ulceration occurs it is advisable to carefully dissect out the growth, apply nitrate of silver, and be careful to prevent dirt or irritating matter getting into the wound. An occasional poultice is serviceable, and also the application of carbolic acid. To prevent the bird pecking the poultice it is sometimes necessary to

fasten the limbs together, and leave the patient in a recumbent position until it is removed and the dressing applied.”—HILL.

“In bad cases the only chance of affecting a cure is by dissecting out the growth. When doing this apply a ligature to the leg, just above the foot; that is, bind it tightly to prevent excessive loss of blood, then carefully cut through the skin all around the part requiring removal, leaving all the sound skin to close over the wound. Next dissect out as much of the affected part as can be removed without injuring the tendons or large blood vessels. Wash the wound by pouring upon it a stream of clean water, and then close it with a few single stitches. Apply a wet pad, and keep it in place with a bandage.”—VALE.

CHAPTER XI.

Miscellaneous Ailments.

IN this chapter are discussed a number of the minor and occasional troubles of poultry which it seemed inappropriate or inadvisable to include in any of the foregoing chapters. Some of them are of quite frequent occurrence, and under some conditions may become serious, but as a rule none of these are dangerous. Some cause sudden deaths. These generally appear only at long intervals or under extreme conditions. In the latter instance a number of fowls may be affected at once, giving the trouble an appearance of epidemic, which alarms the poultry keeper if he has not correctly diagnosed the situation. Heat apoplexy is perhaps the most common trouble of this class.

There are many cases of occasional disorder which are unavoidable under the conditions in which fowls are kept. The larger domestic animals may be given such special individual treatment in feeding and care as their individual welfare seems to require, but fowls to be handled profitably must usually be kept in large flocks, though a poultry keeper with a very large stock of fowls may sort them over, and putting fowls of like disposition and tendencies together, and varying treatment of different flocks avoid largely the troubles of this nature; but on the whole profitable poultry keeping requires uniformity of method in handling the stock; and sorting and special treatment can profitably be followed only to a limited extent.

In the natural course of events those fowls which cannot adapt themselves to the conditions satisfactory for the major part of the flock, are eliminated, either by sale as unsatisfactory, or by disease. A poultryman who is alert to the situation and its requirements works off through appropriate channels all unthrifty fowls, and thus avoids heavy losses. One of less experience or judgment often tries to hold and improve the unthrifty specimens, thinking that by special care and feeding he can make them fit to market, or for layers or even breeding stock. Where this policy is followed, occasional losses, aggregating sometimes a very large percentage in the course of the season, are common. The remedy is to be found in a reversal of the attitude of the poultryman toward the weaklings in his stock.

Abscesses.

The most common occurrence of this trouble is in severe cases of bumblefoot, which was discussed in the preceding chapter. Occasionally abscesses result from injuries, and at rare intervals cases occur of sores like abscesses or boils on various parts of the body of the fowl. In my own experience I have had but one instance of this, several fowls being affected. These fowls were killed, and no further cases developed. Similar cases have been reported to me by a few correspondents—not more than two or three in the last ten years. The cause of this trouble is probably to be found in the condition of the blood of the fowl. Treatment is not advisable.

Apoplexy.

SYMPTOMS.—Sudden death, or paralysis.

CAUSES.—Apoplexy is caused by a rupture of the blood vessels of the brain, which may result from various conditions. Extremely nervous fowls and fat heavy fowls are most liable to it. Fright is the most common immediate cause of the trouble in fowls of the Leghorn type, which often die in the hand when caught under conditions which excite and alarm them. Heavier fowls and old fowls are more likely to have it as a result of over exertion, violent exercise, or a strain, as in laying. Extreme warm weather, particularly if it comes suddenly, is apt to cause heat prostrations among large heavy fowls.

TREATMENT. — As is apparent from a statement of the causes of this trouble, treatment can rarely be given with any expectation of a recovery. Perhaps the only cases which can be treated successfully are mild cases of heat prostration, if found and treated immediately. In such cases the application of cold water to the head may revive the fowl, and if put in a cool quiet place it may be quite itself again in a short time. Most cases of heat prostration, however, are fatal, either because the condition of the fowl which favored the development of the trouble is unfavorable to restoration, or because the case is not discovered in time. The disease is, as far as possible, prevented by keeping fowls in good physical condition, by affording them suitable protection from heat, and by avoiding rough methods and sudden motions in handling them.

Appetite — Abnormal.

SYMPTOMS. — Besides the ordinary variations of appetite inseparable from heavy feeding, which we must accept as a usual occasional condition, and that by compelling the fowls to fast periodically, extreme instances of abnormal appetite sometimes occur. Fowls will acquire the habit of eating non-nutritious or injurious substances, or of taking excessive quantities of substances like shell or grit.

CAUSES.—The causes of these eccentricities of appetite may be found either in the condition of the fowl or in the repression of its natural activities. The disorder may be an accompaniment of digestive disturbances, or it may develop simply as a habit, the fowls being confined too closely, and having for the greater part of the time nothing to do.

TREATMENT.—Treatment in such cases should first prevent as far as possible the indulgence of a depraved appetite. Where fowls eat excessive quantities of grit, instead of keeping the supply up and allowing them to indulge freely, the grit should be taken away, and the fowls fed a diet which will tend to restore the digestive organs to normal conditions. If symptoms can be discovered which will identify any particular disease, treatment for that disease should be given. Generally speaking, an unnatural appetite indicates something wrong in feeding or handling the fowls, and one of the first steps in dealing with it should be to seek to discover what is primarily responsible for it.

Break Down.

SYMPTOMS. — Break down, often also called “break down behind,” probably to distinguish it from “break down in front,” which would be a not inappropriate description of some cases of slack crop, is a very common trouble in the hens of the heavier breeds, especially in old hens that have been heavy layers. Two general forms of it appear. In the most common and permanent form the abdomen has become so enlarged and distended that it drags upon the ground, or the fowl has become so weakened that it cannot maintain the body in its natural position. The two causes frequently combine. In this form the body simply seems to settle down. In the other form the posterior part of the body is depressed, and the anterior parts elevated, and the legs spread until the hen waddles like a duck.

CAUSES.—The causes of the first form of break down mentioned have been partly indicated in the statement of symptoms. In this form a strain in laying is also a cause, and it is so far as I have observed the sole direct cause of those cases in which the body assumes a nearly upright position. The cases of the latter class are usually of temporary duration at first, though after several repetitions the trouble may become permanent. Both forms of this trouble are to a large degree due to constitutional tendencies. They are aggravated by the presence and services of the male.

TREATMENT.—If the hen is not worth curing she should be killed. Ordinarily such a hen, unless clearly suffering, may be sold or used for food. If the hen seems worth a cure separate her from the flock. If possible give her a grass run and a hard grain diet. On no account allow a male bird with her. The general preventive treatment for this trouble is to vigorously exclude from the breeding pens all hens which have it, and also males from stocks having a tendency to it.

Constipation.

OCCURRENCE AND SYMPTOMS.—Except as it may occur in connection with diseases as mentioned on page 30, or following an attack of diarrhea, constipation in adult fowls is extremely rare. In chicks, and especially in brooder chicks it is more common. The symptoms are difficult and painful evacuations of the bowels,

and in worst cases failure to make evacuations. In young chickens efforts to evacuate are frequently accompanied by a peculiar cry made by the chick under no other circumstances, and therefore to the poultry keeper familiar with it an unerring warning of a condition which without it might easily escape notice for some time.

CAUSES.—The usual causes of constipation in adult fowls are indicated in the preceding paragraph. A not infrequent cause is the obstruction of the vent by accumulations of excrement on the feathers about it. This is especially apt to occur following looseness of the bowels in fowls which do not roost. Intestinal worms also may cause constipation by accumulating until their mass blocks the passage. Constipation in chicks is mostly due to crowding, lack of exercise, lack of green food, and sometimes to too concentrated foods, though usually these have the reverse effect.

TREATMENT. — For young chicks treatment is nearly always in the line of correcting conditions, feeding soft mash, and plenty of green food. As a rule it is not worth while to try to give individual treatment to chicks which do not respond to such general treatment. Adult fowls having constipation without obstruction of the intestines, that is merely difficult movements, should not require any treatment further than in correcting conditions and diet. When the passage is obstructed the treatment is according to the location of the obstruction. If it is at the vent with hard accumulation about the vent as well as in the intestine, the external accumulation must be removed first. This is accomplished by soaking in warm water, which loosens the attachment of the mass to the skin, and separates it enough to allow clipping the feathers about the vent to which the mass adheres. If the obstruction has filled the lower part of the intestine, there must be more soaking with warm water or softening with olive or sweet oil. Oil is applied between the accumulated excrement and the skin by using a small syringe or an oil can with very small nozzle. The process is a tedious one, and where the poultryman's time is valuable is unprofitable except in cases of valuable birds. Following the administration of oil it may be necessary to wait some hours for the mass to become soft enough to discharge, and even to remove it bit by bit with a spoon handle or small blunt piece of wood of similar form.

When the obstruction cannot be reached in this way purgatives must be given. Those usually recommended for fowls, are castor oil, epsom salts, and calomel. If none of these is at hand any purgative or laxative used in the household may be given, the dose for a fowl being about the same as for a two year old child. In applying according to this rule it is safe, and more sure of results, to err on the side of a larger rather than a smaller dose than would be given a child of the age designated. Of castor oil the usual dose for a fowl is one to two teaspoonfuls; of epsom salts, twenty to thirty grains are given in a teaspoonful of water. Calomel is given in one or two grain doses, made into pills with lard or butter.

When worms are suspected give one of the remedies mentioned in the chapter on internal parasites.

Cramp.

Under this head different authorities discuss different symptoms. Sanborn describes cramp as a trouble of chicks due to crowding, overheating, and lack of exercise. Salmon does not specifically refer to it. Vale limits it to distortion of the feet, due to contraction of the muscles, and attributes it mostly to improper management. Hill seems to apply it only to contractions of the muscles of locomotion; but by poultrymen generally the term is applied to a greater variety of troubles. One of the most common uses is to describe colicky spasms which frequently are the only noticeable symptoms in acute intestinal disorders, which cause many sudden deaths of young chicks. Considering the broad suggestiveness of the term and the lack of unanimity in applying it in diseases of poultry, it seems to me inadvisable to attempt to treat it as a separate disorder. At the same time the extent to which the term is commonly used makes special reference to it necessary. The reader observing what might be called a case of cramp, should consider it as a symptom, and endeavor through reference to Chapter IV. to identify the trouble back of it.

Dropsy.

An abnormal collection of fluid in cavities or tissues of the body often results from injuries, or develops with the advanced stages of various diseases. This is called dropsy, and our authorities on poultry diseases generally name as many forms of the disease as there are parts of the body conspicuously affected by it.

Dropsy of the Abdomen.—This is the most commonly observed form of dropsy. The distinguishing symptom is great distention of the abdomen, which on examination is found to be filled with fluid, and soft and fluctuating to the touch. The abdomen may be distended from other causes; as accumulation of fat among the intestines, in which case it is firm and hard to the touch. An egg falling into the abdominal cavity causes distention. Its presence there is easily ascertained on examination, and if the egg has remained in the abdominal cavity for some time dropsy will have developed.

Abdominal dropsy develops in protracted chronic cases of disease of any of the organs or tissues in the abdominal cavity, also from injuries to the abdomen from external causes. Treatment is so rarely effective that poultrymen may well regard it as incurable. Indeed, it may appropriately be considered a symptom indicating that his treatment for the things from which it results has been ineffective, or was delayed too long.

Dropsy of the Heart.—Is possibly of as frequent occurrence as abdominal dropsy, but having no special external symptoms, cannot be identified until after death. It occurs with the various forms of heart trouble, none of which can be accurately identified or successfully treated.

Dropsy of the Wattles.—The wattles of fowls often become enlarged and distended with fluid either as a result of an injury, frost bite, or perhaps as a result of the general condition of the fowl. Anæmic fowls are said to develop dropsy as a result of this condition, and though our information on the subject is meagre, it appears that when the cause is general the development of dropsy is not limited to any special locality, but may appear in any one or more of those sections affected by it. In dropsy of the wattles caused by blood disorders, the wattles may be suffused with blood and dark purple in color.

This form of dropsy is often successfully treated. The wattle should be opened at the extreme lower part with a lance, and the liquid in it carefully removed. It should then be syringed with warm water, and the bird kept on clean straw that no dirt may get into the wound before it has healed. It may be necessary to repeat the operation.

Dropsy of the Feet.—This is an abnormal enlarging of the foot and shank, especially noticeable in the shank, which loses the natural curves of its outlines and becomes cylindrical in appearance, suggesting somewhat the leg of an elephant, and occasionally called "elephantiasis," though the disease in poultry seems of quite different character from elephantiasis in human beings. Sanborn says dropsy of the feet is simply a swelling of the feet and toes due to a too sluggish state of the circulation, and that overfeeding and lack of exercise may cause this trouble. For treatment he recommends a laxative, green food, and plain food, with abundant exercise after the feet have regained a normal condition.

Dropsy of the Brain.—Is mentioned by Hill as a disease occasionally affecting young chicks.

Emphysema.

This is a trouble quite common in young chicks. The skin puffs out like a ball in mild cases, the puff being usually about the size of a hickory nut, and located near the juncture of neck and body, and in all the cases I have seen on the side and quite high up. Sometimes there is but one puff; sometimes both sides have them. Occasionally cases are reported where the puffing covers nearly the whole body, the skin of the chick being so inflated that locomotion becomes difficult. These appear to be aggravated cases of emphysema; but I know of no authoritative report on the nature of such cases.

Vale says this trouble is generally found in growing chicks reared in close quarters, and usually found associated with some lung trouble, and is certainly due to obstruction of the air passages, rupture of the air cells, and escape of the air into the intra-muscular tissues. For treatment he suggests puncturing the skin with a needle to let out the air, and giving two grains nitrate of iron to each wineglassful of the chicks' drinking water, and if lung trouble is present treating particularly for it. It is rather to be recommended that no effort be made to treat such chicks. Even if cured of the trouble, they rarely develop satisfactorily.

Epilepsy.

Fowls sometimes have convulsive attacks, frequently accompanied by unconsciousness. Convulsions may be caused by intes-

tinal worms, or by brain or heart disorders. Salmon says that epilepsy also occurs when no apparent cause for it can be discovered. Treatment is successful only when the symptoms are produced by worms in the intestines. (See chapter on internal parasites).

Kidney Troubles.

That kidney diseases occur often among poultry is extremely probable, but they present no special external symptoms, and have been given little attention by investigators of the diseases of poultry.

Leg Weakness.

This term is used to refer particularly to cases where without pronounced lameness the fowl or chick, otherwise seeming to be in good condition, will use its legs very little, the trouble seeming to be simple weakness of those members. The symptoms of leg weakness are so like those of one kind of rheumatism that in isolated cases it is impossible to say with any certainty which is which. When many cases occur the character of the trouble can usually be discovered by examination of conditions to which the fowls are subjected. If the house is damp, or if (though the house is not especially at fault in this respect) continued damp weather prevents keeping it as dry as is desirable, and fowls partially lose the use of their legs, the trouble is more likely to be rheumatic. If the house and atmosphere are reasonably dry, the trouble is more likely to be weakness due to a disproportionate increase in weight and strength, and naturally manifesting itself in the legs first. In the case of chickens fed heavily and growing rapidly it may usually be safely assumed that the trouble is "leg weakness." To some extent the trouble is hereditary, and it occurs oftenest in chicks of the large breeds. Some authorities mention overcrowding and close quarters as causes of leg weakness, but where such conditions are present the leg weakness is more likely to be an accompaniment of diseases which plainly show other symptoms.

Simple "leg weakness" is easily remedied, and when stock is known to be liable to it—easily prevented. For treatment see that the birds have plenty of room, and fresh air day and night; feed no ground or wet grains; in feeding scatter some of the hard

grains where the birds can eat a small meal readily, the rest more widely that to get a full meal they must move about. Do not feed too often—not more than three times a day—while any tendency to weakness is present. Lean meat, cut bone, and green food may be given freely, but fat meat should be avoided. Some authorities advise putting bone meal or phosphate of lime in the morning mash, but I have had more satisfactory results by omitting the mash than by feeding bone meal in it. The trouble is prevented by avoiding an excessive proportion of soft foods, and the too free use of stimulants and condiments, and by the maintenance of good sanitary conditions, but above all by avoiding breeding from birds of loosely knit frames and lacking in that sturdy symmetry of build which characterizes large fowls having strength proportionate to their weight.

“Pip” — Inflammation of the Mouth.

“Pip” is a term in very common use among poultry keepers, and applied chiefly to a symptom occurring in many cases of cold or fever when the nostrils being obstructed and the fowls breathing through the mouth, the skin of mouth and tongue become hard and dry, and a bony tip may form on the tongue by the hardening and drying of the skin of that member, this condition being aggravated when catarrhal discharges adhere to the skin and dry and accumulate. Treatment should be given first for the primary cause of the trouble. Do not attempt to remove the pip by force. Moisten the mouth with vaseline, oil, or glycerine, and when the dry scale is loose enough to be removed without injury to the skin to which it is attached remove it gently.

Rheumatism.

A form of rheumatism which is not readily distinguished from leg weakness was mentioned under that topic. If the fowl so affected continues subject to conditions which develop rheumatic trouble it soon becomes lame, and in the case of a laying hen there is sometimes an apparent connection between imperfectly formed and soft shelled eggs and rheumatism which in fat hens might be attributed to that condition, but when we find it in hens that seem in perfect condition, and sound except for rheumatism, and when

it disappears with the rheumatism, there is seen to be a connection which cannot be explained as due to another cause.

In this the most common form of rheumatism stiffness and lameness are the conspicuous symptoms. There is generally no enlargement of the joints, and no unusual heat perceptible to the touch. As a rule it quickly disappears when the birds are put in warm dry quarters.

Rheumatism with inflammation and enlargement of the joints and ulcerations which may destroy the bone sometimes occurs, probably in most cases as a development from the less serious form of the trouble just described. When the disease has reached this stage treatment of individuals is generally futile, and always unprofitable. In the earlier stages of inflammation and enlargement of joints one of the following treatments may be given:—

“To remove local conditions softly rub the legs with tincture of opium, or extract of witch hazel, and then wrap them in flannel. To meet the constitutional symptoms, put into the drink fifteen grains of iodide of potassium to one quart of water. Bicarbonate of soda or salicylic acid may be used; but we consider the iodide of potassium best in the general treatment of rheumatism.”—SANBORN.

“Begin treatment with a dose of epsom salts, twenty to thirty grains. The following day add thirty to forty grains bicarbonate of soda (baking soda) to the quart of drinking water, and give two or three grains of salicylic acid twice a day. Apply camphorated or carbolie ointment to the affected joints.”—SALMON.

Both of the authorities above quoted mention too heavy feeding of nitrogenous food as a contributing cause in rheumatism, and urge the importance of giving special attention to the supply of green vegetable food for rheumatic fowls.

Vertigo.

This is a trouble not readily distinguished from epilepsy and convulsions, if indeed it should be considered something distinct. Perhaps the best way to treat it here is to consider vertigo a term used by some poultrymen to describe the convulsive symptoms occurring as a result of brain or heart disorders, or of a superabundance of worms in the intestines, or in the advanced stages of diseases like cholera and enteritis.

CHAPTER XII.

Accidents and Injuries.

A NUMBER of the diseases treated in preceding chapters result sometimes from injuries, usually from injuries not noticed in casual observation, and often not discovered on examination, but supposed to have occurred and to have caused the development of disease. A familiar illustration of this class of injuries is found in the disease of the foot called bumblefoot, probably due in the great majority of cases to the repetition, daily or many times a day, of a bruise on the foot which would have no serious results if not often repeated. The accident in this case is repeated many times before it produces results which call attention to it.

In this chapter we discuss accidents and injuries, the effects of which are immediate and conspicuous, and also a few injuries which while conspicuous in results which follow their constant repetition, do not develop disease, and which usually have no more serious consequences than to spoil the appearance of the fowl for the time being.

Baldness.

Bald heads in fowls result either from skin diseases and parasites, or, in females from the tearing out or breaking off of the feathers on the head by the male in the act of copulation. In the latter case nothing can be done to prevent it while the birds are mated. There

is no injury to the hen except in looks. For treatment of baldness due to skin diseases or parasites, see the chapters especially treating those subjects.

Barebacks.

The loss of feathers on the backs of hens by being broken by the feet of the male in service, is one of the most common phenomena of the poultry yard, and at the same time one of the most irregular. Some males mated with only one or two hens will not damage their feathers at all; others mated with ten or a dozen hens will within a few weeks have the feathers broken on the backs of nearly all the hens. In the same flock some hens will have backs bare, while the plumage of others will be in perfect condition. It is often assumed that if a part only of the hens of a flock have the plumage of the back damaged, these must be the favorites of the male, while the others must be either neglected by him or avoid him. When all the hens in a flock have the feathers of the back broken or lost, the usual assumption is that the male bird is of unusual vigor, and therefore valuable for breeding purposes. These conclusions are probably correct, as to some cases, but not of all, and perhaps not of most cases. To speak with certainty on that point would require closer observations than have yet been published, and also a knowledge of the minds of fowls which we are not likely to attain. In some cases it is very clear from the low fertility secured that the services of the male, though well distributed and frequent enough to break the feathers on the backs of every one of his mates, are not effective, and a comparison of the actions of such a male with those of one which gives good fertility without any such unsightly evidence of frequent service suggests that the breaking of feathers may be an accompaniment of ineffective or awkward service. This point is of importance because of the common assumption that the male which breaks the feathers of his mates must be all right, and that females with broken plumage on the backs must have been regularly served. Both conclusions may be wrong. The male described may be impotent or so awkward that most of his services are ineffective, while the female with damaged plumage may be one that refuses the attentions of her mate. Hence it should not be taken for

granted that barebacks in hens are evidence of effective service. There is also reason to suppose that in some instances this loss of feathers is an indication of brittleness in the feathers, and that they are badly damaged by usage which feathers of better quality would take without damage.

As a rule no serious consequences follow the loss of feathers on the back of the hen. A hen in this condition may be more likely to be injured by the spurs of the male, for the feathers furnish some protection, but a male that injures hens with his spurs will often cut them badly through the feathers.

Barebacks caused by the feet of the males should not be confused with barebacks caused by feather eating. In the former case the feathers are broken across the middle of the back, in the latter they are plucked from near the tail.

Bruises.

Superficial bruises, other than those on the feet which cause corns and bumblefoot, occur most frequently on the breasts and hocks of fowls which sleep on a floor containing stones and gravel from which the fowls are not properly protected by bedding.

Bruises due to a blow are not often noticed on a live fowl, because the feathers conceal the broken or discolored skin; but in dressing fowls such bruises are often found. Many of the bruises found under such circumstances were received when the fowls were caught to be killed or allowed to "flop around" after being killed, but others are evidently of different and more remote origin.

Tumors or sores which appear to have been caused by bruises, are sometimes found on fowls.

The best way to treat bruises when discovered is to put the fowl where it will be quiet, and leave its restoration to nature. If nature does not promptly begin to mend matters no treatment that a non-professional can give is likely to be effective. In fact, if the fowl does not promptly begin to recuperate it is quite certain that it has received some internal injury.

Choking.

Choking is a frequent cause of sudden death in the poultry yard. Fowls fed house scraps often choke on pieces of bone or gristle.

Large splinters of cut bone also cause choking sometimes. Choking is most apt to occur when fowls through hunger eat very greedily. I used for years a bone cutter which left many splinters of bone on which fowls might have choked had they tried to swallow them; but the fowls were fed cut bone often, and always at a time of the day when they were not very hungry. The large splinters and ragged shavings of bone were mostly left in the troughs, and I never had a fowl or chick choke on cut bone. The accident, while of frequent occurrence, happens in any particular flock at such long intervals that unless the fowls are especially valuable it is hardly worth while to take special precautions against it. Valuable fowls may be yarded where they will get nothing that is not given them, and the person taking care of them can see that all food is of such size and character that it would not cause choking. But when fowls are only of ordinary value, and when it is desired to feed waste that may contain pieces on which fowls might choke, it will cost less to lose a bird by choking occasionally than to take special precautions to prevent that catastrophe.

Comb Injuries.

The common injuries of the comb are of two kinds, — cuts and frost bites:

Cuts.—The combs of most male birds and of the females of the larger combed breeds are so prominent that being very tender and easily cut or torn, they are often injured in this way. A fowl which flies in alarm against a fence or inside partition of wire netting, is very likely to cut the comb on the wire. A fowl shipped in a coop so low that its comb will strike the top is almost sure to cut the comb on the wire if wire is used, or on the sharp edges of slats if the top is of wood. When the top is as high as it should be there is still some danger of the fowl if alarmed dashing against it and cutting and bruising the comb, but the danger is much less. The point of a nail or tack protruding inside the coop anywhere is quite sure to cut the comb of a fowl confined in the coop.

Besides the wholesale cutting and tearing of comb and wattles which takes place when fowls fight in the open, the combs of males are often badly cut, in extreme cases eaten away, in their efforts to fight through small apertures in fences or partitions. Any damage

done to the comb by cutting is generally irreparable as far as appearances go, but rarely of serious consequence in its effects on the breeding or utility value of the bird. The comb of a vigorous healthy male bird may be literally cut to pieces in a fight and he seem none the worse for it, and his comb heal in a few days without treatment of any kind. But if there are deep cuts or tears resulting in displacement of a part of the comb or wattles, such should be put in place and sewn together with silk thread, and the bird put where other birds will not molest it and there is no danger of injury to the comb while healing. If there is any question in the poultry keeper's mind as to the wisdom of leaving the healing to nature either because he fears that the bird will not recover promptly without treatment, or feels that he ought to do all he can to assist nature, he may isolate the bird, bathe the comb with carbolized water, or with water to which a little chloro-naphtholeum or sulpho-naphthol has been added, and then treat with carbolized vaseline. If this is done the bird must be kept in a clean place where no dirt will get into the comb. My observation has been that recovery from injuries sustained in fighting is more rapid when the fowl is let alone, and that unless a surgical operation is required the best thing to do is to treat the fowl as if nothing had happened, leave him in his usual quarters with his usual companions—but make sure that the fowls which fought cannot renew the battle.

Frost Bites. — The combs and wattles of fowls are often frost bitten; the feet of fowls which have shelter rarely, if ever. Cases of frost bitten feet occur mostly with fowls exposed to severe weather, and are very rare in the flocks of people interested enough in their poultry to take any interest in poultry literature. But combs are so easily frost bitten that it is quite a rare thing for a poultryman keeping fowls with medium to large combs in northerly latitudes to get through a winter without any cases of frost bite. Efforts to prevent it often fail because keeping houses warm enough to prevent frost bites means making the fowls more susceptible to cold. The only absolute insurance against frost bitten combs is in keeping houses so warm that water will not freeze in them, and this most poultrymen find impracticable. The practical ways of securing a measure of prevention are: (1) keeping fowls with small combs; (2) accustoming the fowls to low temper-

atures; and (3) enclosing the roosts so that on cold nights the fowls are practically in a large box where the heat from their own bodies keeps out the frost. None of these methods insure absolutely against frost bites. They simply reduce the possibilities of combs being frosted at ordinary winter temperatures. The first and second, and first and third points mentioned are often combined; the second and third not so often, though some poultrymen do use closed roosting spaces in open houses.

Besides the general means of preventing frost bites just mentioned, special precautions are sometimes taken. Poultrymen whose houses are frost proof avoid letting fowls outdoors when there is danger of frost nipping the combs. Novices whose houses are warm often thoughtlessly let the fowls, which accustomed to warm quarters at night, and coming directly from them, are especially susceptible to cold, out early on cold mornings with the result that many combs are severely frosted at a temperature to which fowls accustomed to cold would be immune. In houses where water may freeze, though the fowls' combs while dry are not frosted, frost may nip the wattles badly if wet in the drinking water, and unless drinking fountains are used which keep the wattles out of the water, it is better to let fowls wait for a drink until the house temperature rises, or give them snow or cracked ice to eat. Mashies so wet that they wet the wattles of the fowls when eating, are to be avoided in cold weather.

The portion of the comb frozen will vary from the extreme points of the serrations and a little edge on the wattles to almost the entire comb and wattles. In severe cases, the comb almost down to the head, and practically the whole of the wattles may be frozen stiff. In this condition the wattles if long and pendulous, will rattle as the bird moves. While not yet thawed out the natural color of the comb is retained, but modified by the white frost. If the trouble is discovered before the frost begins to come out take some cold lard or vaseline, smear it thickly on the affected parts, and by manipulation with the fingers gradually work the frost out and restore the circulation. Light rubbing and gentle pressure along the lines between the frozen part and that which had not been frozen, or to which circulation is restored, will result in a natural restoration of circulation through the areas that were

frozen, and though the comb will be high colored and sore for a few days, it may be saved with the loss of only the skin. When the frost 's out anoint the comb with a mixture of vaseline five tablespoons, glycerine two tablespoons, turpentine one teaspoon. Apply this two or three times a day, keeping the fowl in a cool but comfortable place. A dark coop, opened only to treat and feed the bird, will keep it perfectly quiet and hasten recovery. The comb thus restored is extremely sensitive to cold, and the bird must be carefully kept from exposure to severe freezing temperatures for the remainder of the winter.

If the condition of the comb is not discovered until after it has been thawed out in a rising temperature it will be found highly inflamed. The bird should be removed to quiet, cool quarters, and the ointment mentioned above used as directed. This will alleviate the pain and reduce the amount of the comb that will die and fall off. The frosted part will turn green, and finally black, and as the sound part heals and forms a new skin, the dead part dries up and falls off.

It is generally believed that severe frost bites cause a shock to the system which diminishes the breeding value of a fowl during the following season, but this result is not invariable, and if a bird intended for a breeder seems to have completely recovered from a frost bite the breeder may use it with reasonable assurance that it will prove serviceable.

Fractures and Dislocations.

Broken Limbs.—Fractures of most common occurrence are of the leg, wing, and beak.

A broken shank is easily set by anyone, and the simplest treatment is that given by Sanborn:—"Straighten the bone, wind a two-inch cotton bandage around the limb twice, then place wooden toothpicks up and down the shank; take two turns more with the bandage, cut off the cloth, and fasten with needle and thread."

Sanborn advises killing fowls with broken thighs or wings. Hill considers the setting of broken bones an operation "of simplicity and ease," and though I question whether the average poultryman would agree with him as to any case but the shank, Hill's instructions are appended for the benefit of those who wish to try

to save valuable fowls with bad fractures:—"For fractures below the hock a goose quill makes the best splint. Take a stout one, split it in half or into three, and steep each portion in boiling water, so that it may be softened and flattened out; then smear the inner surface with thick gum, and having adjusted the fracture, the leg being held straight by an assistant, apply the quills over the broken part longitudinally, and bandage them up with tape or narrow linen, which should also be rendered adhesive with gum. Fractures of the thigh may be treated in a similar manner, using pasteboard instead of quill, and well gumming the feathers before applying it. A broken wing, after being placed in proper position, should have the inside feathers well soaked with thick gum, over which place a piece of pasteboard or the bottom of a match box. The long feathers should then be tied together toward the end with tape, which should be passed over the back and attached to the opposite wing. This prevents the injured one from drooping, and if the bird is kept quiet a cure is soon effected."

For bandaging fractures, bicycle tape is good, and can be obtained without delay everywhere.

Broken Beak.—Fowls occasionally have a part or the whole of one mandible broken or torn off. If the injury is slight, trim the broken mandible off symmetrically and trim off enough of the other to make them more nearly equal in length, that the fowl may be able to eat. For serious injuries of this kind it is better to kill the fowl, though instances have been reported of fowls living and managing to secure food with the beak very badly damaged.

Dislocations of the joints of the wings or legs of fowls often result from rough handling, especially when catching them. If the limb is replaced and the fowl kept quiet it will generally recover completely. If the dislocation is not adjusted the limb becomes stiff.

Strangling.

Fowls often are strangled by having the head caught so that they cannot extricate it. This happens when they put the head through an opening wide enough at one point to admit the head, but narrowing so that when the head is moved it cannot be withdrawn. When lath fences are used with laths quite close together fowls

often catch the head between two laths when attempting to fly over, and death follows from strangulation.

Strains.

Under this title I mention an accident in a way the reverse of strangling. Fowls often get hung by the feet. A toe, or the foot, or a spur may catch in wire netting or in a crack, and the fowl hang in this way for hours before being discovered, and when found have the limb that was caught badly strained, while the strain and shock have affected the whole system. If there has been a dislocation it should be replaced. If the parts are only strained all that can be done is to keep the fowl quiet and comfortable. If the strain was not too long continued it will usually recover. If perpendicular spaces between boards or slats in walls, fences, and coops are made either too narrow for the fowl to insert the head, or wide enough to admit of its free insertion and withdrawal, hanging by the head will rarely occur, though sometimes the head is caught fast in the angle of a space amply wide for safety; but hanging by the feet cannot be effectually guarded against where nettings and slats are used. Fowls may fly up against these thousands of times without catching on them, and then the toe or spur catch fast, and I have seen fowls hung by the toe nail caught in a crack in the roosting platform or top of the nest box. Such accidents could only be prevented absolutely by a construction of buildings and fences which would increase their cost far beyond the aggregate of possible losses in this way.

Poisoning.

A great many cases of poisoning poultry occur. These are mostly accidental, though occasionally cases are reported where it is suspected, and apparently with reason, that the poison had been maliciously placed where the fowls would get it.

The symptoms and treatment of poison cases have been described in connection with inflammation of the crop and stomach, diseases frequently due to poisoning, and it remains to treat here only of general preventive measures. For poison maliciously administered prevention is practically impossible. It is so easy for anyone so disposed to give fowls poisoned food without being detected. Accidental poisoning is avoided by keeping fowls on one's own

premises; by properly disposing of all poisonous or irritant substances, and by care in the use of such substances as disinfectants. The greater number of poison cases reported to me occur in flocks at liberty in streets, alleys, and vacant lots where poisonous refuse is often thrown. As the owner of poultry can have no control over what is deposited in such places, poisoning is one of the risks he takes when he allows his fowls to run at large.

Peritonitis.

Peritonitis, inflammation of the membranous lining of the abdominal cavity, is a development with rupture of the intestines, rupture of the oviduct, and diseases of the intestines and other organs located in the abdominal cavity. It may also result from external injuries of the abdomen, and sometimes occurs as a result of caponizing. Protracted cases of peritonitis often develop abdominal dropsy. The disease is almost invariably fatal.

Wounds.

Cuts and wounds elsewhere than about the combs and heads of fowls are comparatively rare. They occur oftenest on the backs or sides of hens, and are caused by the cutting or tearing of the spurs or nails of the male. Sometimes the damage done in this way is very serious. Injuries from the spurs may be prevented by cutting off or trimming them. They may either have the sharp points rounded off, or have the entire spur removed, as seems advisable. To cut off the spur take a fine saw such as is used to saw metal, and staunch the bleeding with powdered chalk or sulphate of iron. Injuries from the toe nails of the male are not so surely prevented. All that can be done with him is to trim and smooth the nails, and this is not a sure prevention, for the stub nail may still tear the skin. I have known of instances where a cover for the back of the hen was used, being made of canvas and secured in place with strings of tape, but this practice is recommended for trial rather than as an approved preventive of injury.

Unless the cuts in the skin of the female are large and very ragged, so that the edges do not come together, they will generally heal without special attention, provided they are not again injured in the same way before the wound is thoroughly healed. To guard

against this the hen should be kept away from the male, and if the wound is very bad it is better to isolate her, that no roughing from the other hens may retard recovery. If a cut or tear in the skin will not unite of itself it should be stitched up, care being taken not to leave any dirt or matter under the skin. A dressing of an antiseptic powder will help to keep the wound in healthy healing condition.

Cuts of the feet of fowls are of more rare occurrence, but when they do occur are often deep, and even when slight should have careful attention, for if neglected the dirt gets into them, and an injury which if given attention at the proper time would have been of little consequence may quickly become incurable. The cut should be washed clean with an antiseptic solution, and bound up to keep the dirt out, and keep the action of the foot from reopening it. If a bad cut it should be examined and dressed daily for several days, by which time healing should have advanced so far that further treatment is not needed. Slight cuts in the feet rarely require more than one treatment.

CHAPTER XIII.

Internal Parasites of Poultry.

MANY of the diseases described in this book are either caused by parasitic bacteria or germs or aggravated by the abnormal increase of some parasite, often a very minute one, which occurs when disease disturbs the balance which normally exists between the development of these germs and the resistant powers of a healthy fowl. Generally speaking, these microscopic parasites require no special attention from the poultryman. He cannot determine their presence or identify them by ordinary observation, and for a knowledge of their existence and the damage they may sometimes do he is wholly indebted to the scientific investigator. But there are two classes of worms which may be found without a microscope, and which may debilitate and destroy fowls when no organic disease exists. These are the gape worm, infesting the windpipe, and the several kinds of worms which infest the intestines. In popular usage the trouble caused by the gape worm is called "gapes," while "worms" in fowls means specifically intestinal worms. The topics will be treated here under those headings.

Gapes.

The disease called *gapes*, and the name *gape worm*, given the worm which causes it, take their name from the "gaping" which is the conspicuous symptom of the presence of these worms in the windpipe in annoying numbers. As gaping is not a symptom peculiar to this trouble, but is common in connection with dis-

turbances of the digestive organs, while a gasping not clearly distinct from gaping may occur with respiratory troubles, it should never be assumed that the trouble is "gapes." An examination should be made. If the gape worms are present they will be found adhering to the trachea or windpipe. They are small, red, round worms, usually attached to each other and to the membrane in pairs, (male and female) presenting somewhat the appearance of a single worm with two heads. The female is about half an inch, the male about one-fifth of an inch in length. If there are no worms visible take a stiff feather (not too large) and having stripped the quill to leave only a little brush at the end, put it gently down the windpipe, turn once or twice, and withdraw. If gape worms are present some should be found adhering to the feather.

They suck the blood, and in small chicks or in large numbers in grown fowls, cause severe irritation, inflammation, and a mucus excretion which interferes with breathing, and is often coughed or spit up. The worms themselves sometimes collect in such masses that breathing becomes very difficult, and may become entirely obstructed, causing death by suffocation.

Gape worms are communicated to fowls from infected fowls and also from infected soil. It is supposed that the contagion between fowls is by eating the worms or their eggs that have been coughed up or evacuated by infected fowls, and that the contagion from infected soil comes through eating earthworms. It is said that the earthworms in infected soil harbor gape worms at all seasons of the year. Infected areas are sometimes small, only a few yards in length and breadth, and if there are only a few of them on the premises and they can be definitely located and bounded and the fowls kept from them, both fowls and chicks may safely be given the run of the rest of the place. To locate and bound these areas, however, requires a more thorough examination of the soil than most people will make, and I have known of only a very few instances in which this was done.

There are large sections of the country in which gape worms are unknown, other sections where the poultryman must wage warfare against them every season. On sandy well drained soils they rarely give trouble. They thrive and maintain themselves best on heavy, clayey soils and in wet and warm weather.

Individual surgical treatment seems to be the only reliable way to rid an infected bird of these worms. Various remedies for treating birds in flocks or groups, either by inhalations, or by medicines have been given, and some have recommended individual medical treatment, but nothing short of the mechanical removal of the worms seems to be generally effective. This is accomplished by using a feather as already described, or by using a loop of horsehair or fine wire. Gape worm extractors of wire are manufactured and sold by dealers in poultry supplies. Anyone can make such an extractor for himself, using a No. 30 wire. Take a piece about 12 or 14 inches long, double it, then twist the two ends so that a loop just wide enough to go down the windpipe and half to three-fourths of an inch long is left at one end, while the wires, twisted together for the rest of their length make the long handle for the instrument. When this is inserted in the windpipe and turned around the worms are cut loose, and what are not withdrawn with the wire are coughed up by the chick or fowl. These worms should be burned. Treatment in this way is tedious. Its general success depends upon the skill of the operator. One who has the knack of performing such an operation quickly and gently may find it profitable, while one who is awkward and rough with the chicks may find that as he performs it the operation is but partially effective for the removal of the worms, and very hard on the patients.

Preventive treatment to be fully effective, seems to require that fowls be kept away from infected ground for several seasons. It is said that ground from which poultry is kept for three years, the land meanwhile being sown to grass or cultivated, will be entirely free from the gape worm. To a poultry keeper whose area of land is small this means moving or keeping no poultry for several years. Where land is abundant gape worms can often be avoided by moving the poultry to a plot not recently occupied by them. Treatment to disinfect the soil by destroying the gape worms in it, the object being to continue the poultry on it, is not often profitable.

Worms (Intestinal).

There are something more than two score varieties of these, but so far as his own treatment of them is concerned, the poultryman

may consider all worms as alike, requiring the same treatment. Worms in small quantities inhabit the digestive organs of all fowls and animals without causing them serious inconvenience. It is even maintained by some authorities that in limited numbers these parasites are beneficial, though in just what way they are beneficial I have never seen stated, and it seems more reasonable, in the present state of knowledge of the subject to claim no more than that when not too numerous they do no perceptible harm. Worms are contagious in that they are transmitted from fowl to fowl, probably always indirectly by being deposited on the ground by one fowl and taken from it by another; but if it is true as stated that worms in small numbers are always present, contagion is not required to account for their increase to troublesome numbers in many members of a flock simultaneously. The more reasonable assumption in the premises is that all these fowls alike were in a condition favorable to an excessive development of the parasites. This is a phase of the question on which the literature of the subject has nothing—yet it seems to be the all-important point to determine.

The symptoms of worms are the general symptoms of dullness and depression, with sometimes convulsions and epileptic attacks. Accurate diagnosis of the presence of worms can be made only by observation of worms voided with the droppings. The best time to look for these is early in the morning, before the fowls have left the roosts, and perhaps eaten any worms that have been excreted. Failure to find worms in the droppings does not prove that they are not the cause of the trouble. Further test should be made with suspected individuals. One or more of these may be confined, separately in clean coops with bare board floors, and the droppings observed. The likelihood of worms being voided, if present, is increased by giving the fowl a dose of vermifuge, as recommended in treating worms, or a purgative dose of epsom salts (see "Constipation," p. 130), though even this test is not infallible, for the worms may be located where the remedy does not reach them. If efforts to secure evidence from the living fowls of the presence of worms fail, and the poultryman is at a loss to account for the trouble with his fowls, a suspected fowl should be killed and examined, and if this is still insufficient, the case should

be taken to a competent veterinary. It is of greatest importance that the facts in such cases be learned and proper treatment given, for whether the worms cause the trouble or conditions exist which favor their increase, the situation is full of danger to the keeper of a flock in which serious trouble is associated with worms; and while I do not wish to unnecessarily alarm anyone, the fact that in recent years worms in epidemic form have put a number of poultry plants out of business, should be stated as a warning to poultrymen troubled with unidentified diseases presenting symptoms which might be associated with worms.

In citing remedies for worms I have preferred those offered by authorities who prescribe moderate doses; for, as Hill says: "It is better to administer a safe dose and repeat it in a week, than an overdose calculated to produce drastic and dangerous results."

Hill says further: "In my opinion *santonine*, in one grain dose, combined with seven grains of *areca nut* is the most useful and effectual poultry vermifuge."

Other remedies prescribed by the same authority are:—

"Ten grains freshly ground *areca nut*, given fasting, in a teaspoonful of warm milk."

"Three minims* oil of male fern in a teaspoonful of salad oil."

"Food should be withheld for three hours after the administration of worm medicine, and then a warm soft meal should be allowed, and this diet continued for a couple of days before returning to ordinary food. It is most essential that all parasites expelled be rigorously destroyed."—HILL.

"Give from ten to fifteen drops of oil of turpentine in a teaspoonful of sweet oil night and morning for three days."—VALE.

General treatment may be given a flock of fowls by mixing garlic or powdered pomegranate root bark with the food. The proportion of garlic may be as large as the birds will eat. Of pomegranate root bark a teaspoonful is mixed with the food for fifty fowls. Whenever practicable a stock which has been badly infested with worms should be moved after treatment to new ground. If kept on the same ground the premises should be disinfected as thoroughly as possible, and whenever practicable the floors of

*A minim may be roughly measured as a drop.

houses and yards should be renewed. Stock that has been greatly debilitated by worms does not make the best of breeding stock, and when stock seems peculiarly susceptible to worms the owner will find it good policy to clean it out and make a fresh start. Indeed that is a good plan to pursue with stock showing special tendency to any disease, and with stock which has been through any serious epidemic. Close selection for vigor in the breeding stock should be sought after such experience with more than usual care, and even when it does not seem necessary to dispose at once of all the stock, it may be wise to gradually replace it with stock free from its weakness.

CHAPTER XIV.

Insects Injurious to Poultry.

THE minute parasites living upon the external surface of the bodies of fowls which cause skin diseases were discussed in Chapter X. In this chapter we consider the universally troublesome lice and mites of greater size and more active habits commonly known as lice, or by those who speak of them with more discrimination, as lice and mites; and also a few other insects occasionally troublesome everywhere, or annually troublesome in some sections. Considered as a class these differ from the parasites causing skin diseases in that their attacks are more vicious and the results more immediately injurious, yet the more prevalent of them are much easier to deal with, for those that live constantly upon the bodies of the fowls the fowl itself combats successfully if proper provision is made for that purpose, and those which visit the fowl only at night to feed may be easily destroyed in their harboring places by day; while those which bite or sting the fowl, but do not remain with them,—or those, as rose bugs, which may kill chicks that eat them, are not so universally troublesome.

Salmon names over fifty insects that prey on poultry, besides the mites which cause scurfy skin diseases and those which live in the connective tissues. But, for purposes of treatment to destroy them or alleviate injuries caused by them, we need not make more accurate distinctions between them than are ordinarily made by

poultrymen who either class all parasites locating permanently on the fowl as lice, or distinguish them according to the regions where they are found, as body lice, head lice, etc., an erroneous distinction; and who generally are acquainted with only two kinds of parasites preying upon the fowl by night and keeping concealed in crevices of the building by day—red mites, and bed bugs.

Lice and Mites.

Lice and mites are probably always present in small numbers on fowls, on chicks hatched and reared by natural methods, and in buildings or coops that have been long used for poultry. Chicks hatched in incubators, reared in new brooders and put into buildings never occupied by other fowls might be absolutely free from lice for a time, but it is so easy for lice to be carried from place to place, and while not numerous they may escape notice so completely that it is not safe to assume that premises are absolutely free from lice because precautions supposed to prevent the bringing of lice upon the place have been taken. Though such precautions are undoubtedly useful for their purpose, one should not rely too implicitly upon them, but should also make such general provisions as are required to keep lice in subjection when they are assumed to be present in small numbers.

Cause of Lice—How to Keep Them in Subjection.

The first cause of lice is always contagion. They pass from fowl to fowl and with fowls from place to place. With ordinary cleanliness and suitable provision for the fowls dusting themselves, the poultryman whose fowls are rugged and thrifty has no occasion to wage the constant hand to hand conflict with lice which many writers insist upon as one of the principal features in success with poultry. The presence of lice in troublesome numbers may be taken as proof positive of weakness or unthriftiness in the stock or of slackness somewhere in care. Many poultrymen seriously troubled with lice will deny the first condition, resent any reflection upon their management, and insist that the lice were introduced accidentally, and in spite of precautions, or that they are unable to subdue them because the remedies tried prove ineffective. But it can be demonstrated that lice are very easily kept from increasing to troublesome numbers without ever giving treatment especially

for lice to any healthy fowl. All that is necessary is to have sunny, well ventilated houses and coops, in which damp droppings and litter are never allowed to accumulate; to promptly isolate sick, dull, and listless fowls, transferring them while in such condition to a building never used for other purposes, and not directly connected with any other building, and to provide suitable dusting places for the fowls. When these items are given proper attention special treatment of the whole flock for lice may be omitted. The fowls and the conditions will take care of them.

While what has just been said is true, it is equally true that on most poultry plants special treatment is necessary. There are several reasons for this. Perhaps the most important is the comparative rarity of flocks containing none but rugged fowls. It frequently happens that in an entire stock of hundreds of fowls a bird in perfect physical condition is a rarity, and the owner does not appreciate how his stock has deteriorated in condition. Again, it is often thought desirable to use for breeders or keep in laying pens specimens known to lack in vitality, and though the reasons for doing this may be good, the doing of it reduces the capacity of the flock to take care of lice without special assistance. In the matter of cleanliness a great many poultrymen while going to the extreme at some points, are slack in others, and consequently instead of a uniform condition of reasonable cleanliness they are over careful in some things, but leave opportunities for the lice to increase unmolested, and finally overrun the premises. The provision for dusting is too often such that the fowl will use it only (so to speak) under protest. There is a very general misconception as to the proper material for the dust bath,—coal ashes, or road dust composed largely of pulverized horse manure, are favorite materials, and the usual custom is to put these in a box only large enough for a few hens to use at a time. Sometimes insecticides are mixed with the material of the dust bath to make it more effective for the destruction of insects. My observation has been that such dust baths are patronized only as a last resort—that the lice have to be very annoying before the fowls will use them. Fowls wallow by preference in clean sandy loam that is not absolutely dry. Dry dust and ashes rob the feathers and skin of necessary oil. Damp earth removes dirt from the feathers without absorbing oil. The

primary purpose of wallowing is the cleansing of the feathers. Incidentally lice are destroyed. It is held by some authorities that in limited numbers lice serve the useful purpose of causing an irritation which prompts the fowl to wallow. Suitable and ample wallowing places for fowls should be made in their yards for weather when the ground is open. For winter, in a house with an earth floor, renewed annually as it should be, the most satisfactory way is to frequently rake the litter from the sunniest part of the floor, and allow the fowls to use it to wallow in, forking it over, and breaking it fine for them if the surface is at all caked or the ground so moist that it does not pulverize well.

I have introduced this matter relating to the general remedial and preventive measures against lice in connection with the presentation of the causes and methods of distribution of lice in order to make as emphatic as possible the statement that such perpetual systematic treatment of fowls and houses for lice as many poultrymen religiously carry out is unnecessary, a waste of time, and a curtailment of profits. It is necessary only in so far as there is failure to make conditions which make it unnecessary. The conditions which make it unnecessary are essential conditions of good management. The subjection of lice is an incidental, yet practically sure result of these conditions. Departures from these conditions in the direction of laxness call for appropriate special treatment, but the amount and duration of such treatment should be regulated by the occasion for them, not by routine. Unquestionably regular treatment for lice when thorough is effective, but the amount of time consumed in regular treatments that are never thorough, and the amount wasted in routine treatments that were not necessary, represent in the aggregate an enormous waste of effort.

Insistence on the necessity of omitting unnecessary treatments for lice, and of making needed treatments thorough, may seem on the surface superfluous, but from long years of experience with poultry, with and without lice, as well as with poultrymen having trouble with lousy fowls and buildings, I know how rare it is to find in practice the wise middle course between neglect and excessive precaution.

Having provided in the selection of fowls and in general management for conditions which reduce to the minimum the danger of troublesome increase of lice, the poultry keeper should adopt this rule of special treatment for lice :—

Treat with insect powder every sick fowl, every fowl that has been cooped for some days where it could not dust itself, every sitting hen when set, and at least twice again during the period of incubation, the last time just before the eggs are due to pip; treat the young chicks and hen when a brood is taken from the nest, and at intervals of a week until three weeks old.

Special Treatment for Lice.

This rule observed, the general conditions unfavorable to lice being maintained, should give full insurance against troubles from lice on either the bodies of the fowls or in the houses. But as poultrymen are often mistaken in their judgment as to the quality of their care of fowls, as well as of the vigor of the fowls and their ability to resist the attacks of parasites, and as from various reasons poultry keepers unavoidably fail at times to maintain the conditions they know are advisable, it is not wise to rely absolutely on the general fact of preventive conditions, but whenever indications or suspected indications of lice are observed an examination for them should be made and appropriate treatment given, care being taken always to make the treatment such as will effectively check the development of the pests.

Lice of any of the common troublesome kinds are easily found by an expert when present, and it is hard for the expert to understand how they escape the notice of anyone looking for them, yet in innumerable cases where lice are literally swarming, people have declared that they failed to find them. This being the case it is advisable that a poultryman whose fowls or chicks seem unthrifty, with the symptoms of listlessness and inactivity produced by severe attacks of lice, treat for lice even though he is not sure of there being any. Then if the trouble is due to lice they are destroyed, while if the weakness is of other origin the treatment is beneficial in that it comes when the fowls need it to prevent the rapid increase of the few lice presumed to be always present.

Lice on small chicks almost invariably attack the head, where

they may look like feathers just starting. When very abundant they may be found in the down on other parts of the body, but as a rule they will be on the head if anywhere. It is customary among poultrymen to call them "head lice," though the same lice on older fowls are found regularly on the body, especially in the fluff, and under the wings.

On chicks these lice may be killed by a powder that is actually an insecticide, or by the application of lard, vaseline, or ointment. When the chicks are "greased" each one must be handled separately, and the "grease" applied with the finger, usually to the head, under the wings, and about the vent. This method is practiced more perhaps than any other. While effective, it is a very tedious and laborious process, and quite unnecessary, for with an insecticide and a powder gun such as is sold for "fly" powder, a whole brood, including the hen, may be thoroughly treated in less time than is consumed in preparation to treat the brood by greasing.

Pure pyrethrum, or Persian insect powder, is the most generally procurable insecticide available for this purpose. There are worthless imitations of it on the market, and on the other hand, it is the efficient ingredient in many insecticides sold under trade names. The frequency of adulteration of this article, and the fact that effective insecticides are sold under various names, make it advisable to insist here on the need of testing for efficiency whatever article is used. When to be used on chicks, this is very easily done. If lice are observed on the head of a chick, hold the chick in the hand, and either sprinkle a little of the powder on the head and rub in lightly with the finger, or apply with a powder gun. If the insecticide will stupefy and kill the lice they release their hold and drop off. If they do not it may be assumed that the article on hand is not effective used in that way. Unless the powder used is known to kill it is a waste of time to use it, and *grease*, which is certain, should be used at once regardless of the labor involved, for two or three large lice which cause little annoyance on the body of an adult fowl, will kill a small chick in a few days, and even in a single day may so drain his vitality that he will never make up the loss.

Older chicks and fowls are treated with powder by holding by the feet, head downward, so that the feathers relax and allow the

powder when applied to penetrate to the skin. The easiest way to apply the powder is with a powder gun, and if an insecticide of known efficiency when applied to chicks is used, a few puffs into the feathers around the vent and under the wings is all that is necessary. Only a little powder is used, and there is no waste. The powders on the market vary greatly in insecticide properties. Those possessing little of such properties are still effective if used freely and well worked into the feathers. Any fine dry material can be used to kill lice in this way, if thoroughly applied, as a fowl applies it when wallowing. While it is not denied that most insect powders have more destructive properties than dust or ashes, the greatest efficiency of many of them is in that thoroughness in application which is insured by the fact that they are comparatively expensive, and so must be properly used. The repetition of treatments of old fowls for lice should be governed by indications of the presence of lice. Usually it is advisable to give a second application about a week after the first. Dusting machines, in which four or five fowls at a time may be dusted, are sometimes offered for sale, and some poultrymen make such appliances for their own use. The effect of such handling on the fowls is open to question. Old fowls are sometimes greased for lice, a most tedious process, and one that no one whose time is of any value can practice. Dipping of fowls in liquid solutions for lice is a barbarous practice, now generally abandoned.

Red Mites.

The most common and troublesome of lice visiting the bodies of fowls only to feed, is the little red mite. From the practical freedom of my own premises from this pest for many years, until I deliberately cultivated it for experimental purposes, I can affirm that it is easy to prevent by the general preventive measures advocated earlier in this chapter; easy to subdue by thorough treatment, yet hard to completely eliminate when once it has been allowed to spread through a plant.

These mites take their name from their color when gorged with blood. In this condition they may be found by day on the under sides of the roosts, and in cracks and crevices about the ends of the roosts. When few in number they may not be conspicuous,

but as they increase they may be found, especially at the end of the roosts in masses which if the roost is disturbed are crushed and leave a bloody smear at the spot. Before the mites themselves are thus conspicuous, and before their attacks on the fowls have any noticeable results, their "tracks" may be found about the places where they congregate. They excrete matter which looks like a gray or whitish fly speck, and these gray specks, plainly seen by the observant poultryman, are the first indications of the presence of red mites.

The red mites are easily destroyed by applications of whitewash, kerosene, crude petroleum, hot water, and carbolic acid, or solutions of any of the numerous liquid lice-killers upon the market. All that is necessary to clean them out is to treat them daily in their harboring places on and about the roosts until none can be found. The number found is less each day, but as their habit is to retreat by day to the most convenient hiding place, they go to inaccessible places only when the nearer ones are overflowing. Hence their destruction becomes merely a matter of treating them as found. The important points are to make each application thorough, and to repeat daily at first, then at longer intervals, until no more mites can be discovered on the roosts. By persistence in this course they may be completely eliminated, but I have found that a course of treatment which destroys them to the point where they will give no more trouble that season, may still leave enough to make trouble the next season if given the opportunity to do so.

Bedbugs.

What are known to poultrymen as bedbugs, and supposed to be identical with the bedbug which infests dwelling houses, Salmon supposes to be the dovecot bug, an insect which attacks pigeons especially, but sometimes attacks poultry, and when once established in a poultry house seems to be the most troublesome of insect pests, being not nearly so susceptible to liquid lice destroyers as the red mite. It may, however, be eliminated by persistence in the course of treatment described for mites.

Fleas, and Stinging Insects.

In some sections fowls—especially chicks—are often bitten by fleas, and the bites are quite painful. The remedy for inflamma-

tion from flea bites is to bathe with vinegar and water, and apply carbolated vaseline. Fowls are occasionally stung by bees or wasps, but it is rarely that the stinging is seen, and the effects are as likely to be supposed to be due to some other cause. The treatment recommended for flea bites is beneficial in any inflammation of the face, the part oftenest stung or bitten.

Rosebugs.

Rosebugs are said to kill chickens which eat many of them, by the hooks on the legs catching in the side of the crop and causing intense irritation which finally results in death. No satisfactory way of avoiding losses from rosebugs has been offered, except to keep chicks where they cannot get them. It appears that they cause trouble only when very numerous and when freely eaten by the chicks, but our exact knowledge of the subject is very limited. In my own experience I have had no losses from chicks ranging where rosebugs were quite numerous sometimes.

CHAPTER XV.

The Vicious Habits of Fowls.

FROM the fact that the earliest writers on poultry diseases discussed bad habits of fowls under the general subject of disease, it might be inferred that they had anticipated those who regard many vices in human beings as the result of physical malformations or disorders. But while I have no wish to deprive those early writers or those who followed them of any credit due them, it is more likely that the discussion of bad habits was included in early chapters on diseases because some of them are naturally suggested to the mind when treating of diseases which show symptoms resembling the results of bad habits, and some bad habits originate indirectly from certain disorders. Thus feather eating comes up for consideration very naturally after discussing a disease causing loss of feathers, and the egg eating habit often owes its origin to a diseased condition which causes the fowl to lay abnormal eggs.

With the possible exception of feather eating, the common vices of fowls may develop and continue in fowls that are and remain in perfect physical condition. They are bad habits not injurious to the fowls that have them, but dangerous to the victims or destructive of profits. In general they are a result of the conditions to which the fowls are subject. Close confinement and crowding, and perhaps the deficiencies in food or irregularities in feeding too usual where such conditions obtain, are the common causes of most of

the bad habits of fowls. The reader will note that I am less positive about the connection between errors in feeding and some bad habits than many who discuss these topics. This is because it does not seem to me to be evident in enough cases to justify considering it a general cause, and because I have found that the owners of fowls which develop bad habits when closely confined, crowded, and with nothing to do the greater part of the time, are always seeking for something that will cure the habit without putting them to the trouble or expense of correcting the conditions responsible for it. Practically they consider the bad habit as a disease, and we might class it as such under the broad definition of disease as "a life, the manifestations of which deviate more or less from the normal." But equally for the prevention and treatment of bad habits it is essential to understand that they are the result of artificial conditions, and that fowls not subject to such conditions rarely have these habits. I do not from my own experience or observation know of any instances of the bad habits discussed in this chapter developing among fowls at liberty or in quarters so roomy as to give substantially the conditions of full liberty.

At the same time the conditions under which these habits develop, do not invariably develop them. They are simply special risks of these conditions. As such they call for prompt and vigorous treatment when they make their appearance. This treatment to include as much change in conditions as necessary to make remedial measures quickly effective, for habit is more contagious in fowls than in most creatures, and time given to futile efforts to break bad habits is time in which those habits are extending and their bad results increasing. Fortunately these vicious habits are few in number, and their presence easily observed at the outset.

Feather Eating.

The evidence of feather eating is seen in the entire loss of feathers from a portion of the body of a fowl, in a ragged condition of the feathers, the web frayed and partly stripped from the quill. The entire loss of feathers is oftenest from the rump. The ragged condition more commonly of the feathers of the neck, though both conditions may be noted in both sections. The difference in "symptoms" seems to be due to several things, but perhaps

principally to the fact that when fowls submit to have their feathers plucked at the feather is not pulled out so often as when the fowl tries to escape, while when a victim of the practice tries to avoid it, the attacking fowl is more likely to seize a feather near the rump, and the combined force of the fowl pulling the feather and that trying to escape results in the feather being pulled out, when with less force it would only be damaged. When fowls submit to mutilation of their feathers the progressive destruction finally results in leaving the parts attacked bare. While the first evidences of feather plucking are likely to be seen in the section mentioned, and the worst effects found in those areas, the vice if allowed to continue leads to a partial destruction of the plumage all over the fowl, leaving it in a most unsightly condition, and no doubt also sometimes seriously affecting health and productiveness. Feathers plucked out will grow again if no further attacks are permitted; but where the quill remains no restoration takes place until molting time.

When evidence of feather eating is discovered, the first thing to do is to find the culprit. Usually there is at first but a single bird with the habit. In a small flock one or two birds may seriously damage the plumage of all the rest—so much so that it might be supposed the habit general. Sometimes the feather eaters are the only birds in the flock not damaged, and suspicion usually attaches to the birds that do not suffer from the habit. But to make sure one must watch until he catches fowls in the act. Unless the fowls detected are of uncommon value, and unless the habit is general, the best way to do is to kill the feather eaters. When this seems inadvisable, the most satisfactory remedy is to give the fowls something to do. Instead of feeding cut bone or lean meat in chunks which they can greedily swallow, give them bones with shreds of meat dried on them, or hang up strips of hard dry meat, by picking at which they can keep busy. Feather eating is often developed by fowls confined together on exhibition. A veteran exhibitor claims that any such case can be “cured” by feeding the fowls developing the habit a liberal feed of bologna sausage. His idea is that in the salt and spices contained in the sausage the fowls get something the lack of which in their diet was responsible for the outbreak of the habit. From my general experience and obser-

vation of the effective correction of bad habits in fowls, I do not attach much importance to remedies to be taken internally. When they do seem to make a cure it is a question whether it was due to something they supply or to the fact that they diverted the attention of the fowl long enough for it to forget the habit. The sure cures for feather eating are removal of worst offenders, and giving the flock something to do.

Poultry bits of wire, to prevent feather eating, were at one time much recommended, and may still be used occasionally. Their use seems to have been more common in England than here. The bit of fine wire was inserted on the upper mandible at the nostrils, and prevented the beak being closed tight. The fowl was thus unable to grasp the feather.

Trimming the edges of the upper mandible with a knife, is also said to make the fowl incapable of taking a firm hold on a feather. Such measures, however, are of but temporary effect or partial efficiency. The sight of fowls attempting, though unsuccessfully, to pull feathers, may lead other fowls to imitate and acquire the habit.

Comb Eating.

This vice is peculiar in that almost invariably the male in a pen is the victim, and his mates the offenders. Like feather eating, it is one of the vices of idleness. The mystery is why the males so indifferently submit to it. They will stand quietly while the hens eat away large portions of the comb. The trouble begins when a hen pecking at the comb of the male, perhaps at something she sees there, as an insect, or a small scab, starts the blood, and the first slight taste of it gives an appetite for more. Other hens are likely to join her, and the comb of the male may be ruined in appearance in a very few minutes.

The male so affected should be removed from the pen, and not returned until the comb is thoroughly healed. Meantime the hens should be given plenty of exercise, and if there has been any shortage of animal food in their ration, it is well to give them dried meat as recommended for feather eating. I have never been able to discover any close connection between comb eating and improper rations, but it is possible that it does exist in some cases, and in any event, the dried meat furnishes one of the most attractive kinds

of occupation for idle hens. It is not necessary that hens should be compelled to exercise or kept busy all the time. All that is necessary is to make such provision for exercise that when a hen feels like doing something, there is something appropriate for her to do, and she is not thrown entirely on her own resources. Scratching litter, vegetables, and meat to pick at, etc., are the usual provisions for this purpose.

Egg Eating.

Egg eating generally begins with an egg broken in the nest, and eaten either by the hen that lays it or by a later visitor to the nest. Breakage is oftenest of soft shelled and thin shelled eggs, and so the habit may owe its origin to something in the condition of fowls laying such eggs. The treatment of such troubles is considered in Chap. IX. Here we have only to discuss the habit of egg eating, which, from beginning with the eating of one egg broken accidentally, may develop until all the flock are persistent egg eaters, and will break and eat all eggs they find.

Besides eggs broken in the nests, eggs dropped on the ground often furnish the incentive to pick and break them. Some curious things may be observed by watching the actions of hens in such cases. They are much more likely to attack, from curiosity an egg they see the hen drop in the yard than one they find lying there, and they may become quite persistent in breaking and eating eggs on the ground, yet never trouble those in the nests. If it were not so, the habit could no doubt be more general than it is, for it is not at all easy to guard against the occasional dropping of eggs on the floor of the house or in the yard.

When eggs are broken in the nest they are not always eaten. When an egg is found broken in the nest it should be removed and the nest cleaned out and new nest material put in without delay. The cleaning up process should be looked after even if the egg has been eaten, and only the soiled material indicates what has taken place. Either the remains or the traces of the broken egg are usually easily found any time on the day of the accident, so that if the attendant who gathers the eggs is at all observant the case ought to be noticed at once. There may be no further trouble, but that lot of fowls should be watched until the situation is fully

known. Then if a hen lays soft shelled or weak shelled eggs she should be removed, treated for that trouble, and not returned to the pen until she lays normal eggs. If the eggs of the flock generally are weak shelled, see that the supply of oyster shell is full. If the weakness of shells is due only to lack of material, a change will be noticed within a very few days after the supply has been given. Dark nests are generally recommended to cure egg eating hens. In such nests, it is supposed, the hen cannot see the egg, hence will not break it or eat it if broken. These dark nests, so arranged that no direct light is admitted to them, the only light in them coming through the passage by which the hen enters, will prevent egg eating sometimes, but are by no means a reliable cure when once the habit becomes fixed. It is no easy matter to make a nest that a hen will lay in, and make it at the same time so dark that she cannot see an egg if determined to break and eat them. When the habit is bad dark nests should be used, but their use should be supplemented by making conditions which will attract the hens from the nest and the house as much as possible. It is also an advantage to change the fowls to a new pen or house where arrangements are unlike those to which they have been accustomed. Change and range will cure egg eating when everything else has failed.

Such remedies as rotten eggs, (or eggs containing nauseous doses); left where the fowls can get them, supplying broken egg shells without stint, etc., may work sometimes, but are not reliable for established cases.

Cannibalism in Chicks.

Young chickens sometimes pick on one or more of their number, generally the small and weak, and tear them to pieces. Like comb eating in fowls, this trouble seems to develop accidentally. It begins oftenest with picking at the foot of a chick that has been injured, or on which the punch mark has not healed; or picking at the rectum. In this latter case it is supposed that the passage of bloody matter, or blood adhering to the down about the vent, furnishes the first incentive. The trouble is so rarely seen at the very beginning that it is not best to be too positive on such points. It seems to break out oftenest among brooder chicks, and to be more likely to develop in chicks of the more energetic.

and curious types of fowls, but it may occur with any chicks under any conditions. It will, in most cases, be found that the removal of the one, or few, ringleaders in the matter puts an end to it. To identify may call for some close watching, sometimes for more continuous watching than it is convenient to give; but as with feather eating in a flock, the detection and removal of a single individual sometimes puts an end to the trouble, and it is much better to maintain a continuous watch, and get at the real facts than to apply general remedies blindly. In cases where the habit seems to be too general and too well established to admit of a remedy by elimination of the worst offenders, such measures as are recommended for feather eating may prove effective. It should be said, however, that information on the subject is not extensive or definite enough to make it advisable to dogmatize about either the causes or the results of treatments for this vice.

CHAPTER XVI.

Molting.

MOLTING is a natural process occurring gradually and inconspicuously in young chickens as they outgrow their feathers until as they arrive at maturity they have a complete coat of adult plumage, and afterwards normally occurring annually. In the annual molts, the first of which begins when the fowl is about sixteen months old, the change is very noticeable. Sometimes the old feathers fall out all at once, leaving the fowl quite naked. Oftener the change is more gradual, but still conspicuous both from the ragged appearance of the fowl and from the contrast between the old, dead, dirty feathers not yet shed, and the bright, clean, new feathers replacing those that have been molted out.

When all conditions are normal, the fowls in good condition at the beginning of the molt, and fed an abundance of nourishing food, molting should proceed quite rapidly and the fowl require no special treatment. But with fowls kept under artificial conditions, the hens heavily fed to force a large egg production, and the males often required to serve a much larger number of females than would constitute their harem in a state of nature, and to continue service through a much longer period than under natural conditions, to a very large proportion of fowls retained for a second or third season, the molting period is a trying time, and special feeding, tonics and stimulants may be required to bring them through it satisfactorily. As a rule it will be found good policy not to try to carry

over fowls that show lack of vigor as the molting season approaches. Such a fowl of only ordinary value is not a good risk at this period. Even when such fowls are disposed of and only thrifty looking fowls kept over, it will usually be found that a portion of them do not molt freely, and if given only ordinary treatment, seem to steadily run down as the season advances. For these cases a little tonic or stimulant may be of great benefit.

The general treatment and care of stock during the molting period need not differ materially from the care of the laying stock, but if it can be done conveniently it is a good plan to give hens that have been confined during the greater part of the year full liberty or the run of a large yard. Many fanciers who wish to keep over valuable breeding hens will turn them all out together in a grove, brush lot, field or any convenient place where the land is fresh and the condition as nearly natural as possible. When this cannot be done the poultry keeper should make it a point to see that his molting hens have as good care in every respect as when eggs are bringing highest prices or when he is trying to secure from them fertile eggs that will hatch vigorous chicks. Many poultrymen neglect the molting hens, and many others in their zeal to secure proper conditions for molting follow the ill advised instructions of writers who warn them to avoid fattening foods at that period. Heavy feeding of a ration rich in starch and fat is to be avoided when fowls are overfat at the beginning of a molt, but generally the most rapid molting and the finest coats of new feathers are secured by a liberal use of fattening foods as well as of animal and green foods, and when molting fowls are not progressing satisfactorily on a ration presumed to be "balanced" for the production of feathers, I would recommend that before giving tonics or stimulants the keeper try the effect of more corn and corn meal, and resort to medicines only when it is apparent that they are needed. A number of condition powders and tonics for fowls that are on the market are good in such cases, their chief service I presume being as condimental accessories to a diet generally lacking in such ingredients. Professional medical men generally advise very strongly against the use of such commercial articles, saying that if a drug is required it should be a drug or compound specially administered in accordance with a diagnosis of the case.

Whatever force there may be in this argument as applied to larger animals, (and we have to consider that the professionals' advice on the point may be influenced by personal interest), much of it is lost in the application to fowls, for professional treatment is out of the question in all ordinary cases. The poultryman must rely upon himself, and many times will find it much better to take his chances with a general remedy — especially one with which he has had some experience—than to attempt to make an accurate diagnosis and apply a specific in accordance with it. So while I would not recommend the use of condimental foods as generally or as continuously as most manufacturers of such goods do, I do feel that the poultryman serves his own interest best who with neither excessive faith in them nor unreasonable prejudice against them, takes a standard article of this kind and by trial observes its results until by experience he learns when and how to use it. Tonics may also be given in the drinking water. Sanborn suggests for this purpose one-half teaspoonful *nux vomica* to two quarts of water, or twenty grains citrate of iron and quinine to the same quantity of water.

Individual fowls differ greatly in their molting habits. Some molt quickly, others very slowly, even when in good condition. Fowls that are much debilitated molt very tardily, and sometimes fail to drop a part of the old feathers. Male birds that have had hard service are especially prone to fail to make a complete molt. Fanciers watch their birds carefully when molting, and when any are observed in this condition pluck out the old dead feathers and so secure the growth of new. Inexperienced exhibitors often exhibit specimens that have not completely molted. Hens that have laid very heavily are often slow to molt, and in rare cases hens continue to lay and fail to molt at all.

Frequently hens molt twice in the same season. This seems most likely to occur when they molt very early, but our knowledge of the irregular phenomena of molting is too incomplete to warrant any positive general statements on such points as that, or the winter molting of pullets that began to lay late in the summer or in the early fall. Both these phenomena are of frequent occurrence, but it has not yet been ascertained that they follow any rule.

Various methods of forcing molting, inducing an early molt, and

securing a rapid one, have from time to time been announced, often with indorsements that carry weight; but the general results of tests of such methods do not give positive results regularly enough to establish the usefulness of the methods.

It has been observed further, that those whose experience was most promptly reported as confirming the claims of processes for regulating the molt, are the same who are quite regularly identified with positive results from each "new thing" offered poultrymen; a fact which greatly diminishes the authority of their reports with those who observe it.

APPENDIX.

The Air Sac Mite.—This is a minute parasite infesting the air sacs of birds. When existing in fowls in small numbers they seem harmless, but when they increase greatly they cause debility, and sometimes serious diseases. When numerous they appear as a fine whitish powder on the surfaces of the air sacs, and any such symptom observed in dressing fowls calls for an investigation, preferably by an expert. Salmon while mentioning fumigation with tar and sulphur for affected birds, advises that no birds from such flocks be sold for breeding or used as breeders, and appears skeptical as to the parasite being exterminated by any means short of the killing off of the entire stock.

Black Rot.—Sanborn describes this as a gangrenous condition of the comb, developing oftenest in fowls with tall combs. The whole or a part of the comb may turn dark and finally drop off. Causes—uncertain. Treatment, $\frac{1}{2}$ teaspoon muriate of ammonia to the pint of drinking water; paint comb three times a day with a lotion of one ounce water, $\frac{1}{2}$ ounce glycerine, 2 grains carbolic acid. Provide air, sunshine, and green food in variety.

Fish-Skin Disease.—Mentioned by Sanborn as resembling scaly leg, but not caused by parasite. He attributes it to deficiency of oil in skin. May be treated as mild case of scaly leg.

Nodular Taeniasis.—Described by Salmon as an intestinal disease characterized by nodules resembling tubercles. These nodules are supposed to be produced by tape worms. Little is known of this disease.

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